

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



FIVE DOLLARS PER YEAR

OCTOBER, 1957

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From first to last, Texaco Ursa Oil proves best

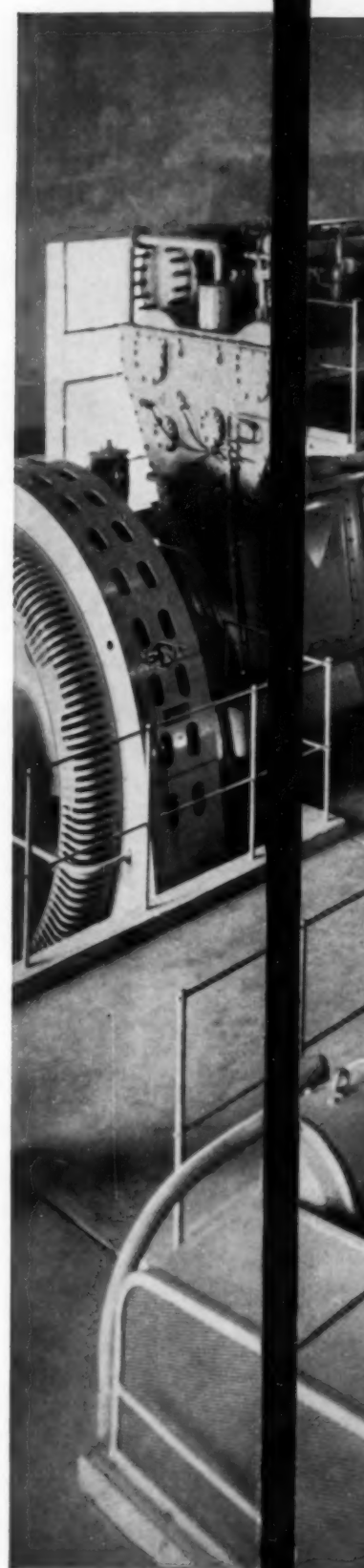
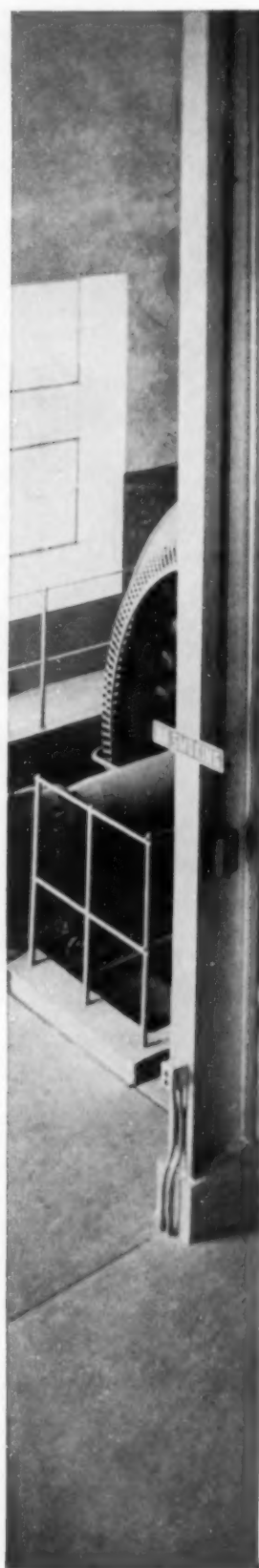
This report from the Natchitoches, Louisiana, Light and Water Plant proves again the outstanding performance of *Texaco Ursa Oil*.

In 1947, the plant installed a 1,000 h.p. Fairbanks-Morse diesel, and began lubricating with *Texaco Ursa Oil*. Engine has stayed clean and run dependably ever since, with rings free, wear and deposits at a minimum. In fact, the original crankcase oil is still in use and is in excellent condition.

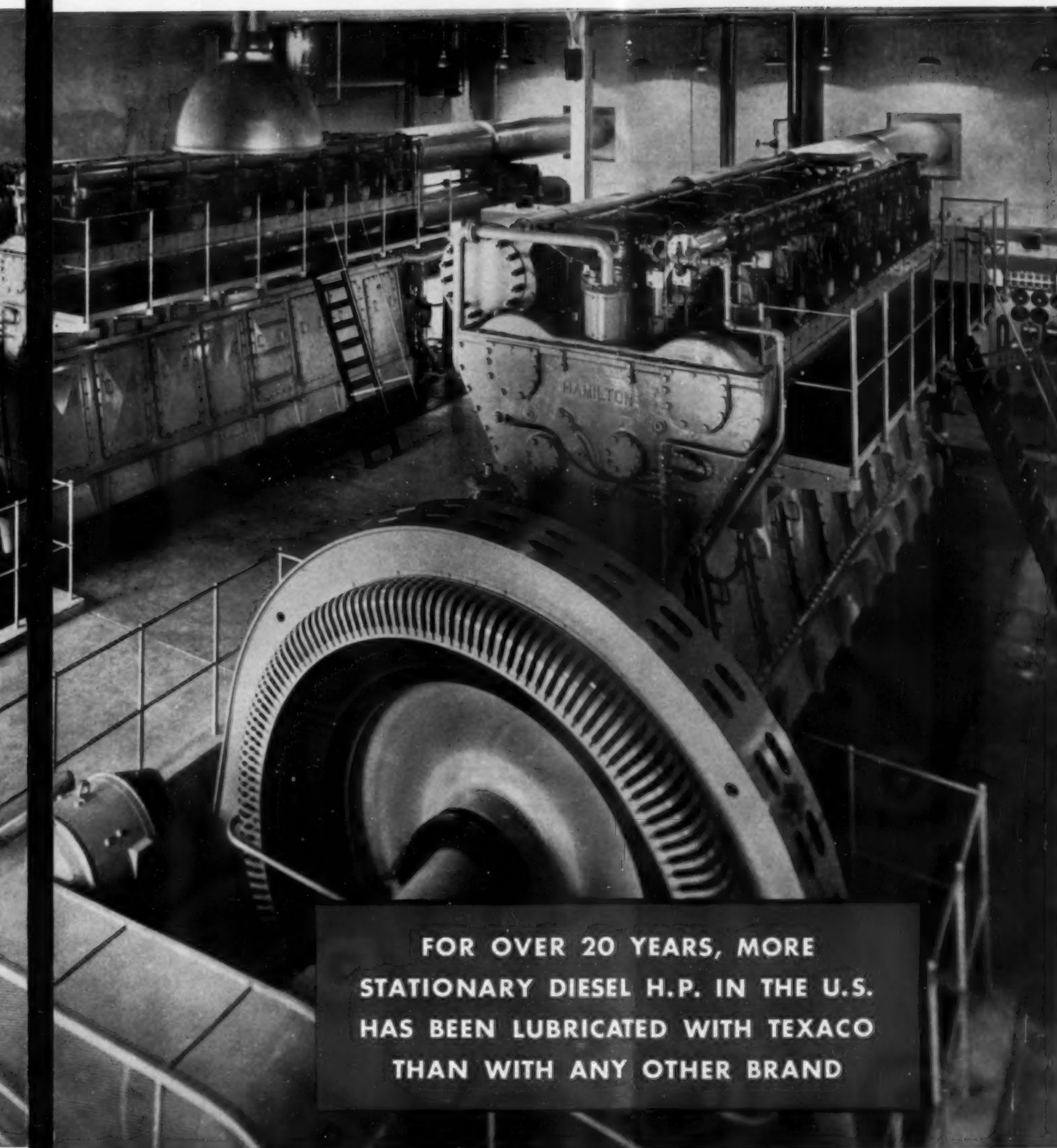
Because of these highly satisfactory results, *Texaco Ursa Oils* were chosen to lubricate two 2,150 h.p. Nordberg dual-fuel engines purchased in 1950 — and again for two 4,220 h.p. Baldwin-Lima-Hamilton diesels installed in 1955. Inspections of all units show rings, ports and crankcases in exceptionally clean condition.

Operators everywhere enjoy similar benefits. There is a complete line of *Texaco Ursa Oils*, especially refined and processed to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

A Texaco Lubrication Engineer will gladly help you select the ones best suited to your needs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



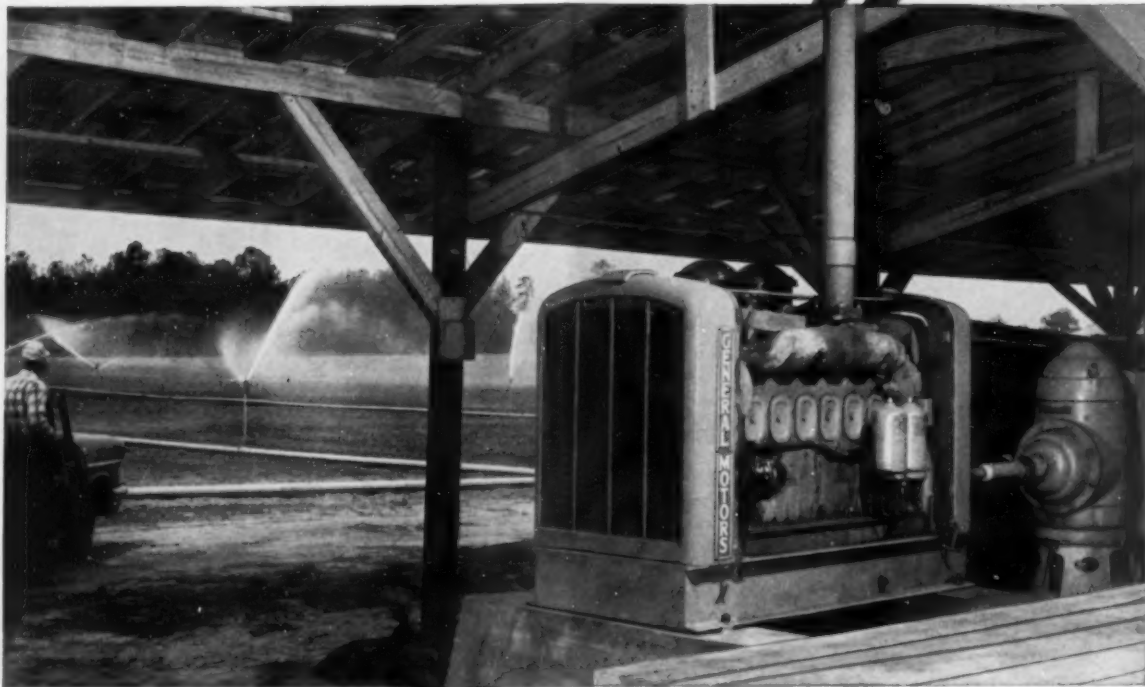
TEXACO



FOR OVER 20 YEARS, MORE
STATIONARY DIESEL H.P. IN THE U.S.
HAS BEEN LUBRICATED WITH TEXACO
THAN WITH ANY OTHER BRAND

URSA OILS FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

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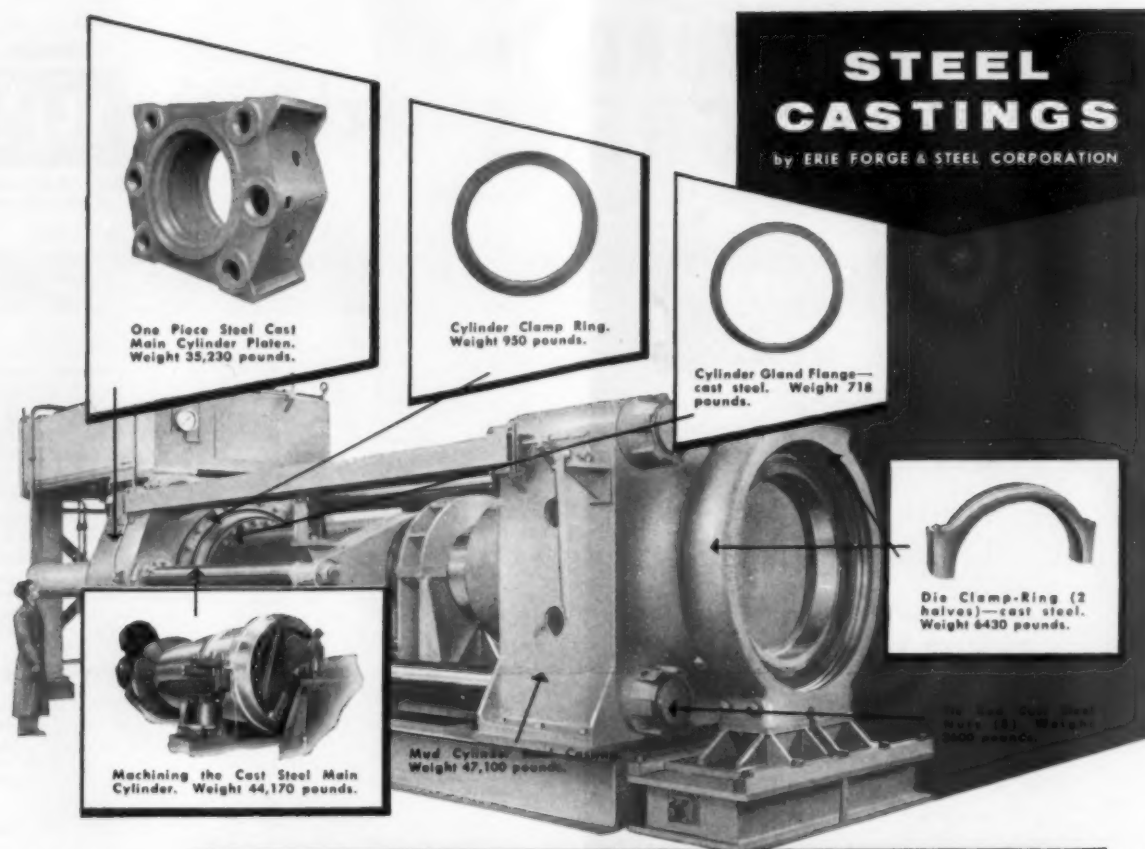
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FRONT COVER ILLUSTRATION

An International Harvester 65 Payhauler coming down the mountain with a full load on a road project in Oregon. This winding road drops 270 ft in a distance of 750 ft, but this huge truck, powered by a Cummins turbocharged diesel, handles the grade with ease.



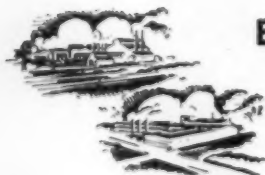
— for Erie Foundry Company's 2000 Ton Hydraulic Carbon Extrusion Press



Some 73 tons of steel castings by Erie Forge & Steel Corporation provide the rugged, brute strength built into this 2000 ton Hydraulic Carbon Extrusion Press by Erie Foundry Company in Erie, Pa. Steel castings are made from raw materials to finished product within our plants. The responsibility for the quality and dependability of these components in the finished machine rests squarely upon our shoulders.

Many years of experience in making specification steel components, both cast and forged, for Erie Foundry Company's

heavy hydraulic presses and forging hammers suggest that we can serve you in a similar satisfactory and profitable manner. Steel castings and forgings are produced completely here "Under One Responsibility and One Control". Every step in their production from beginning to end is directed and closely followed by our metallurgical quality control and engineering supervision. You may expect a call from your nearest Erie Forge & Steel Corporation field engineer in the near future.

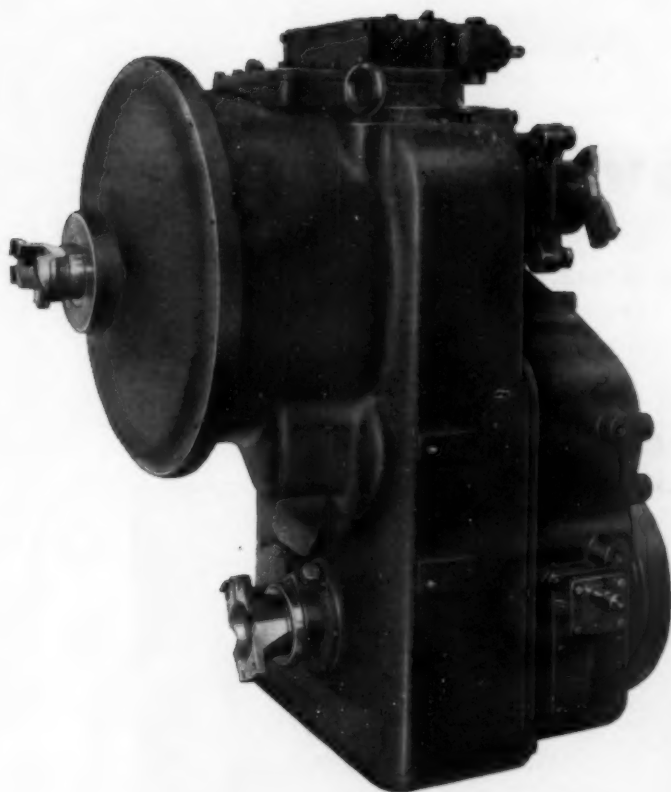


ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

MEMBER AMERICAN IRON AND STEEL INSTITUTE





ONLY THE WESTINGHOUSE POWER SHIFT TRANSMISSION GIVES YOU ALL 3

1 2 3

4 SPEEDS FORWARD, 4 REVERSE

COMPACT, INTEGRAL DESIGN

500 FT-LBS TORQUE CAPACITY



The new power shift transmission by Westinghouse is designed for use on engine-driven equipment used off the highway where multi-speed operation is required.

Consisting of a torque converter and a power transmission compactly designed in an integral housing, the Westinghouse power shift transmission combines in one package the desirable features of the hydraulic torque converter, fluid coupling and power shift transmission. The entire unit is less bulky, takes less space . . . can be less expensively installed and maintained.

With four speeds forward and reverse, the Westinghouse power shift transmission is ideally suited for vehicles which must travel in both directions during a normal work cycle. Using the simple, rugged counter-shaft principle with constant-mesh gears, field maintenance is reduced to a minimum. The transmission has two ranges, with each range having two speeds, both forward and reverse. (A high range for high vehicle speeds at moderate loads and a low range for low vehicle speeds at heavy loads.)

Simple to operate, a flip of the operator's lever accomplishes power shifts within each range, including forward and reverse . . . and without any interruption of power flow through the transmission and drive.

Automatic feature of the converter and ease of power shifting simplifies operator training and substantially contributes to longer operating life of the equipment. Absence of clutch pedal assures smooth, maximum traction acceleration.

Rated at 500 ft-lbs maximum input torque, the Westinghouse power shift transmission can be used with a wide range of internal combustion engines . . . including the Continental PE-200-1; Cummins HRBB-600, JT-6, JBS-600; General Motors 4-71, 3-71; Hall-Scott 590; Waukesha 140-GZB, 145-GKB, and many others.

J-07363A

CHECK THESE SPECIFICATIONS:

| GEAR RATIOS | |
|-------------|---------------------|
| LOW RANGE | FORWARD AND REVERSE |
| 1st gear | 6.85 |
| 2nd gear | 3.43 |
| HIGH RANGE | |
| 3rd gear | 2.14 |
| 4th gear | 1.07 |

OPTIONAL EQUIPMENT: Direct connection to engine fly-wheel; converter tail shaft governor drive; speedometer drive; parking brake.

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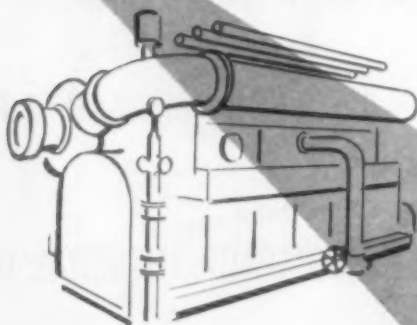
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WOODWARD GOVERNORS

For Diesel Driven Pumps and Compressors

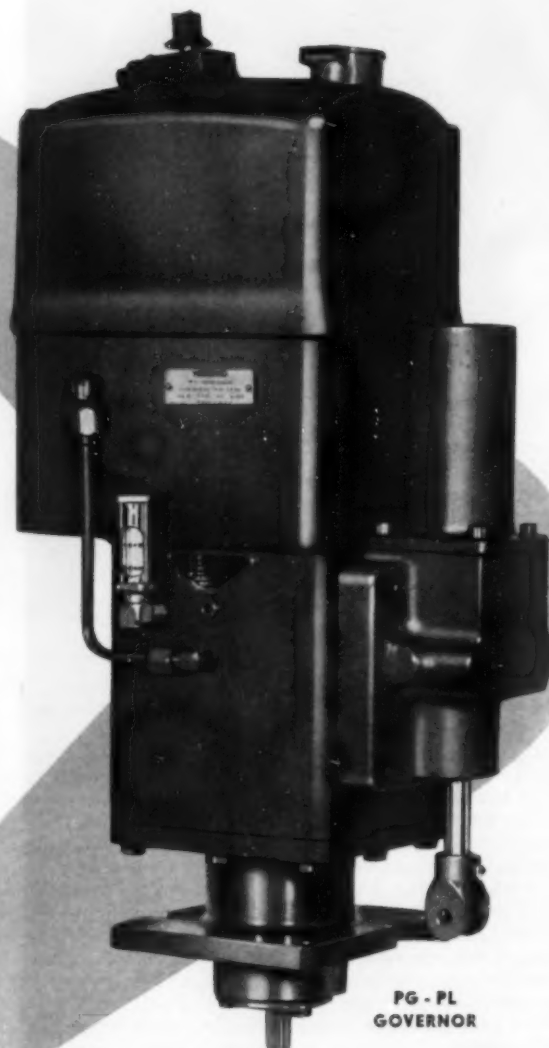


The Woodward PG-PL Governor is one of many special purpose variations of the basic Woodward PG Governor. It was first used on pipelines but its use is now much more general.

When automatic control of engine speed setting is desired the PG-PL Governor is superior in most ways to other methods of automatic speed setting. The use of the PG-PL Governor is also advised for manual remote speed setting in locations where the use of electrical devices is prohibited. It is also advantageous for sugar mills, marine engines and other special applications.

Receiving its control air pressure from a suitable air controller the PG-PL Governor will control an engine at any speed necessary to maintain constant output-pressure, suction pressure, differential pressure, flow, suction pressure (with an override if discharge pressure becomes excessive), and any other quantity that can be measured by air controllers. The same air signal can adjust several engines simultaneously.

The PG-PL Governor is suitable for completely unattended operation if desired. Special modifications are available for hard to control engines. Woodward engineers are always ready to help you solve difficult problems of control.



PG - PL
GOVERNOR



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Give serial number of typical governor when requesting any information.

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WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY



SUPERIOR 1400-H. P. DIESEL AND BENDIX INJECTION PUMPS CUT FUEL COSTS 53%

When Straits Towing, Limited, of Vancouver, B. C., repowered its eleven-year-old tugboat, the "Johnstone Straits", with a new 1400-H. P. White Superior diesel using Bendix* injection pumps, remarkable operating savings were immediately effected.

With this new and efficient diesel equipment, the "Johnstone Straits" now operates almost exclusively on low-cost bunker fuel with an amazing reduction of 53% on fuel costs. Previously most marine operations on bunker fuel had been restricted to large diesels of 2500 to 10,000 H. P. operating at 100 to 200 r.p.m.

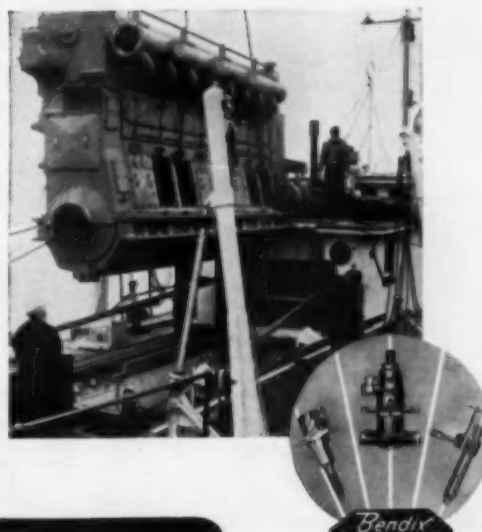
The "Johnstone Straits" is in service on the British Columbia coast and is used to tow heavily loaded ore barges and to haul huge log rafts over a 600-mile run.

Here, indeed, is another example of how Bendix injection pumps and White Superior diesels cut costs and maintain efficiency on even the most rugged jobs.

That's why you will find that wherever the job requires completely dependable service at low operating cost, Bendix is the choice for fuel injection equipment.

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SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N. Y.
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Scintilla Division
SIDNEY, N. Y.



This new "Jimmy" Diesel is available for any make truck 26,000 GVW and up

*New GM "71E" Diesel
can cut gasoline engine
operating costs in half*



Here's how a "Jimmy" Diesel fits your truck

| LOAD | MODEL | HORSEPOWER |
|-------------------|----------|-------------------------|
| 35-45,000 GCW | "4-71E" | 140 gross HP @ 2100 RPM |
| 40-60,000 GCW | "4-71T"* | 171 gross HP @ 2300 RPM |
| 50-76,800 GCW | "6-71E" | 210 gross HP @ 2100 RPM |
| 60,000 GCW and up | "6-71T"* | 236 gross HP @ 2100 RPM |

*New GM Turbopower Diesels—higher power with little increase in size or weight

THIS General Motors Series 71 "E" engine for trucks and buses is the newest version of the time-proved GM 2-cycle Diesel, popularly known as the "Jimmy" Diesel to users the world over.

It will save more money, perform better at all speeds and last longer than any other engine on the road today—for these important reasons:

- **Modern 2-cycle advantages**—more power per size and weight—*twice* as many power strokes per crankshaft revolution as 4-cycle Diesels—smoother running—faster accelerating—better high-altitude performance.
- **New 4-valve cylinder head** and 38% larger air intake capacity for improved combustion and the cleanest "breathing" known—smoke-free exhaust.
- **Unit fuel injection**—with new free-flow spray tips—more "go" per gallon—maximum output on minimum fuel.
- **Lower maintenance costs**—simpler design requires fewer maintenance hours, and maximum interchangeability of low-cost parts assures lowest costs over the entire life of the engine.

Here is a more compact, lighter-weight Diesel that will fit any heavy truck you own or buy—and compared to gasoline engines, it will cut your operating costs as much as 6¢ a mile!

See your GM Diesel distributor about repowering your present equipment. When you're in the market for new trucks, ask for this great new GM "71E" Diesel. And if the truck you choose isn't immediately available with a "Jimmy," turn your truck over to the GM Diesel distributor for a "71E" installation.

**DETROIT DIESEL Engine Division of
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Single Engines ... 30 to 300 H.P.
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—available in 1485 applications
of power equipment built
by more than 175 manufacturers
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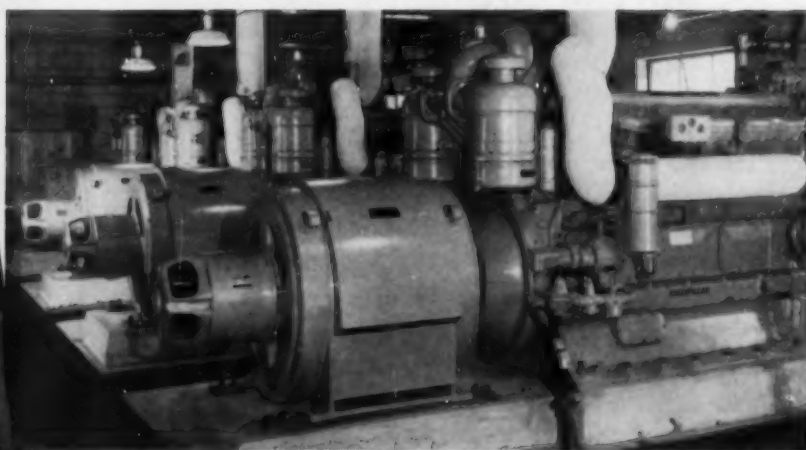
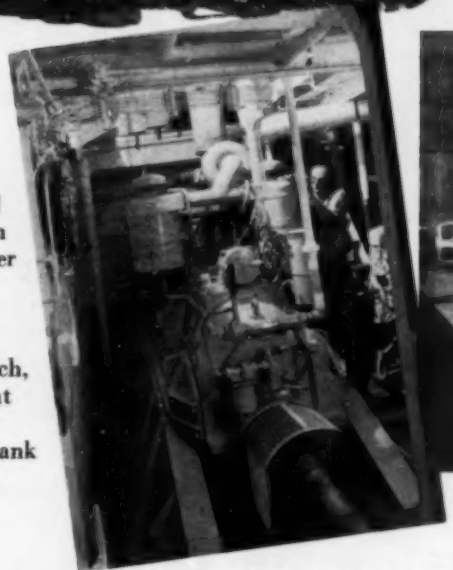
EARTHMOVING turbocharged diesel tractors set new records for yards of dirt moved per day, skid record loads of logs, clear roads, uproot mesquite with 14 ft. root plow, perform with sea-level efficiency up to 12,000 ft.



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built machines
up performance
with

AIRESEARCH TURBOCHARGERS

MARINE
turbocharged diesel engines in the inland river towboat, *Papa Guy*, are rated at 490 horsepower each, allow the boat to tow two 20,000-barrel tank barges per trip.



POWER PLANT turbocharged diesel engines at the Barton Light and Power Plant in Vermont raise output more than 25% while decreasing fuel per horsepower hour, noise and smoke.

In every diesel application, AiResearch turbochargers have improved engine performance to an outstanding degree. The exceptional efficiency of their basic design and turbine wheels makes them the finest in the industry.

They provide the following advantages: increased power up to 100% depending on engine design

and application; lower specific fuel consumption; lower engine thermal loading and less smoke and noise. AiResearch turbochargers are air cooled, eliminating additional load on the cooling

system and also eliminating complicated plumbing. Experience with thousands of units in the field proves their extreme reliability and durability.

• *Your inquiries are invited.*

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

| MODEL | F-51 | C-60 | A-60 | E-100 | B-100 |
|---|-------|-------|-------|--------|--------|
| Output — lb/min. (Standard Conditions) | 29-31 | 30-60 | 38-60 | 50-100 | 60-100 |
| Diameter — in. nom. | 10.0 | 11.5 | 15.25 | 15.1 | 15.4 |
| Length — in. | 10.5 | 12.9 | 16.75 | 14.7 | 17.1 |
| Weight — lb. | 40.0 | 95.0 | 125.0 | 112.0 | 135.0 |

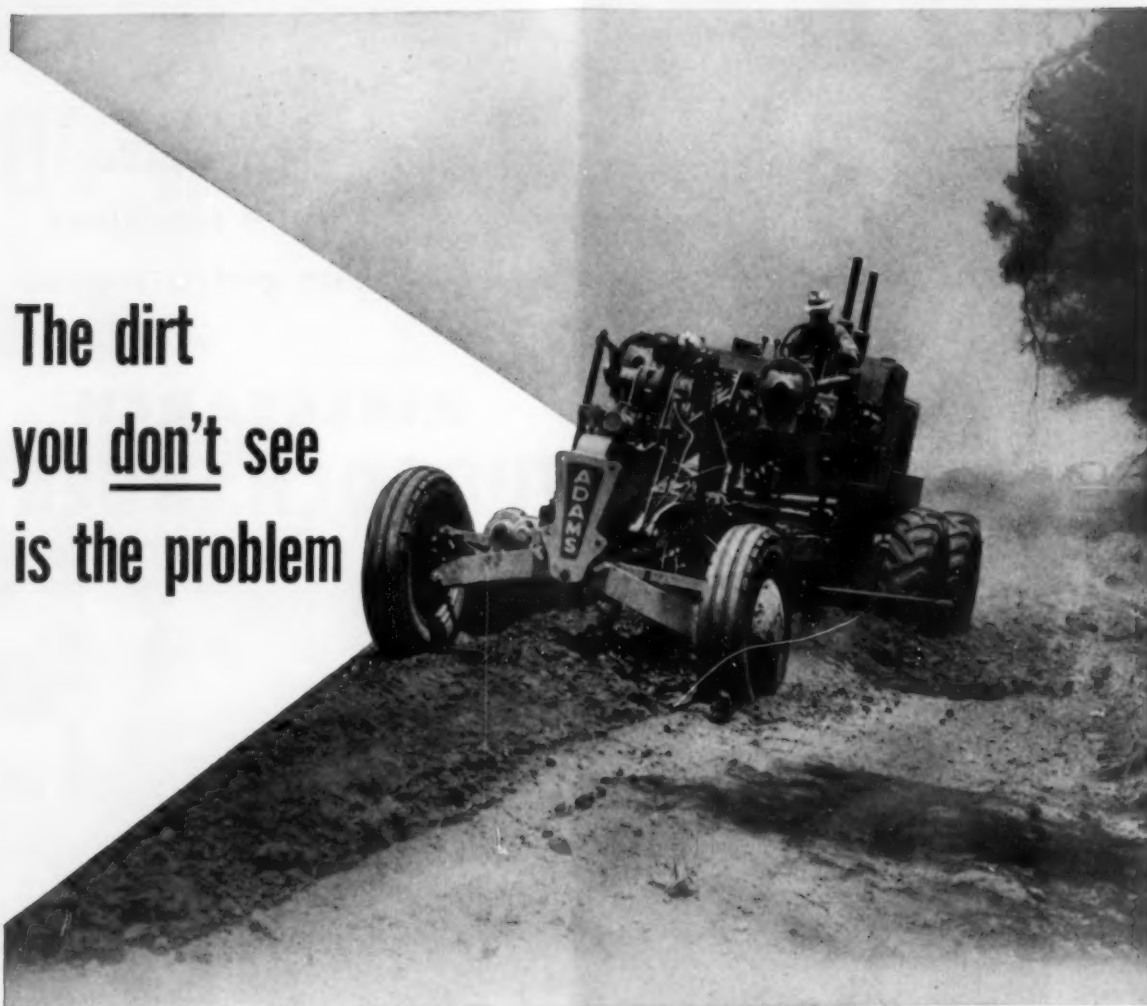


AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

The dirt
you don't see
is the problem



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The tons of dirt this grader moves in a day don't give it any trouble at all. But just let a little of the dirt that's drawn in with the air intake get through to the engine and it'll stop dead in its tracks. That's why efficient air filtration is so vital to the operation of this equipment . . . why engine and equipment manufacturers have accepted Purolator's new Dry Type Micronic® Air Filter as the most efficient yet developed.

Whether your engine is idling or revving at top speed, this new Purolator Air Filter removes 99% of all contaminants. That makes it virtually impossible for harmful abrasives to get into the precision parts of the engine no matter how dirty the job or where you're working. The Dry Type Micronic

elements save time and effort in servicing, too. Elements can be replaced in one-tenth the time — and with one-tenth the effort — needed to service other types.

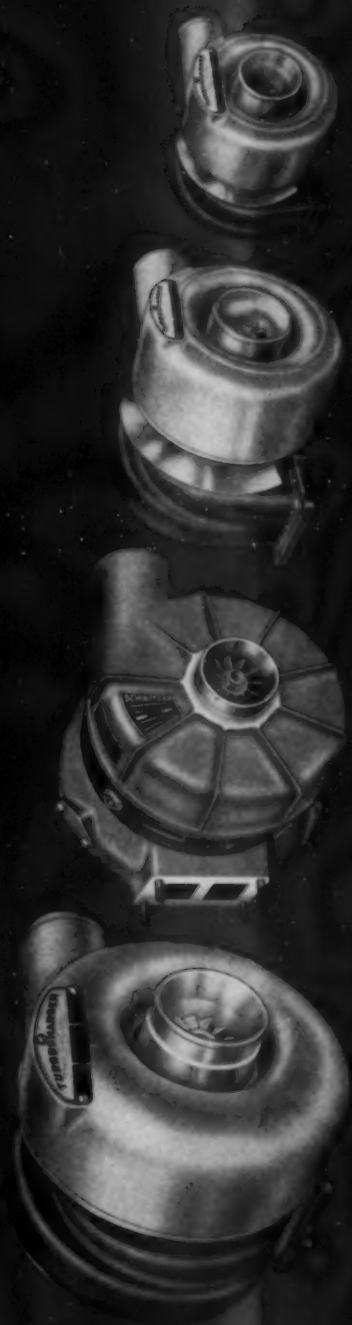
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Here's why torque converter equipped machines do *more* work at *lower* operating cost

For higher work capacity on any given load, and for greater all-round daily production, more and more contractors are specifying torque converter drives in their new excavators, erecting cranes and loaders. And here are five good, profitable reasons why the torque converter is the preferred type of drive:

1. The torque converter eliminates lugging and stalling . . . permits engines to work at maximum efficiency delivering constant high-horsepower output for heavy digging loads and fast swinging.

2. *Smooth* converter power reduces peak loads throughout the machine's drive train because fluid within the converter absorbs much of the impact energy caused by quick drum speed change . . . thus protecting *both* driving and driven equipment.

3. When necessary, the torque converter smoothly delivers approximately twice normal torque to the drum, which, at slow digging speeds, represents an important advantage in power delivered to the dipper.

4. Cable life is extended since no sharp impact loads ever reach cables through the torque converter . . . constant line tension is maintained . . . there's no jerking or snapping.

5. An infinite variety of ratios is available to work with . . . permitting smooth, accurate, *safe* control of loads and delicate "inching" and "holding" under power . . . as well as adjusting for wide variations in dipper loading, substituting greater digging effort for speed, when required.

Wherever earth and rock are moved, wherever steel is erected, you'll find contractors using these five advantages . . . to convert their horsepower into *greater-than-ever* profits!

. . .

Twin Disc Torque Converters—*three-stage* or *single-stage*, from 30 to 1000 hp—are available from all leading manufacturers of heavy-duty machines. Be sure to specify one in your next unit. Take advantage of the five reasons why torque converter equipped machines do *more* work at *lower* operating cost.

Twin Disc is the world's leading manufacturer of friction clutches and fluid couplings for heavy-duty industrial applications . . . and the only manufacturer producing *both* three-stage and single-stage torque converters. Because of its complete line of industrial drives, Twin Disc can offer *unbiased* recommendations for any heavy-duty power transmission application.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

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Shell Dromas Oils—cutting oils for high-production metalworking
Shell Rimula Oil—for heavy-duty diesel engines

SHELL TALONA R Oil 40 offers two outstanding reasons for its acceptance as a top-rated diesel-electric locomotive lubricant. It provides superior anti-wear protection and maintains engine performance.

Greatly reduced wear on pistons, rings and cylinder liners is assured because of the selected combination of additives used in Talona® R Oil 40. It has high oxidation stability, com-

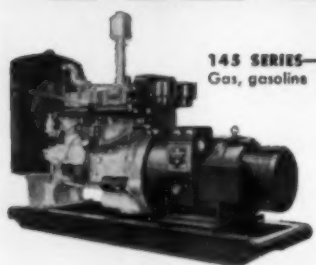
bined with resistance toward corrosion and sludge formation. It prevents ring fouling and provides excellent detergent-dispersant action.

Today—railroad operators abroad can enjoy the same Talona R Oil 40 the domestic carriers rely upon. For complete information, write to Shell Oil Company, 50 West 50th St., New York 20, N.Y., or 100 Bush Street, San Francisco 6, Calif.

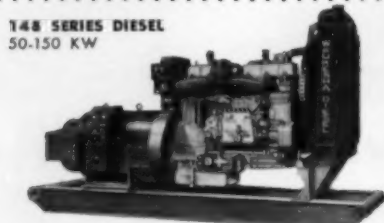
SHELL TALONA R OIL 40



WAUKESHA



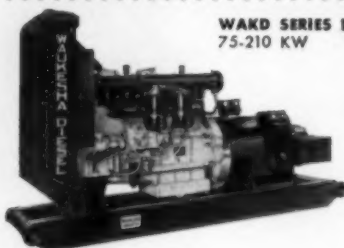
143 SERIES—45-110 KW
Gas, gasoline



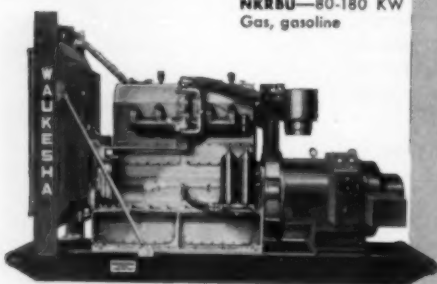
148 SERIES DIESEL
50-150 KW



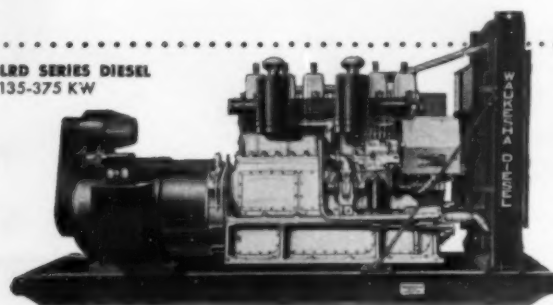
WAK SERIES—75-170 KW
Gas, gasoline



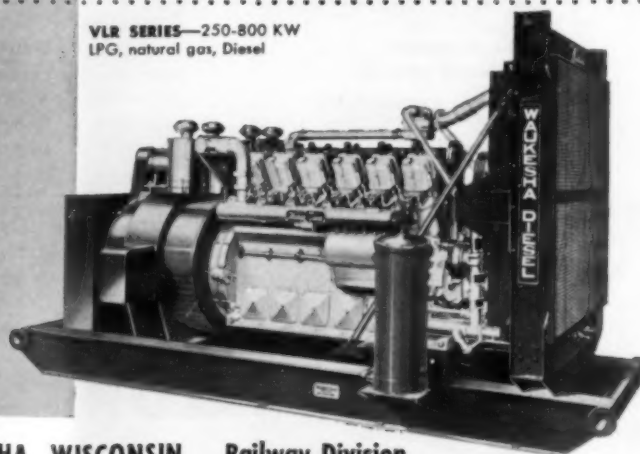
WAKD SERIES DIESEL
75-210 KW



NKRBU—80-180 KW
Gas, gasoline



LRD SERIES DIESEL
135-375 KW



VLR SERIES—250-800 KW
LPG, natural gas, Diesel

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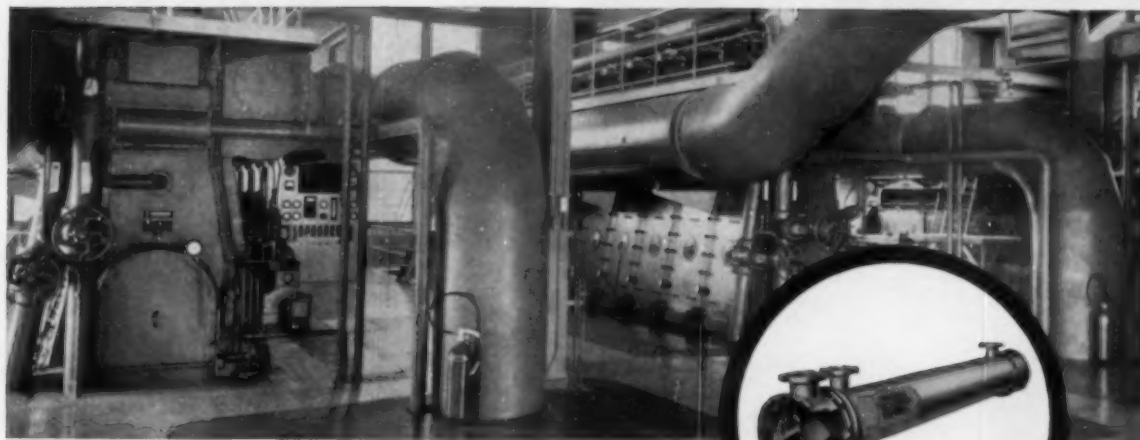
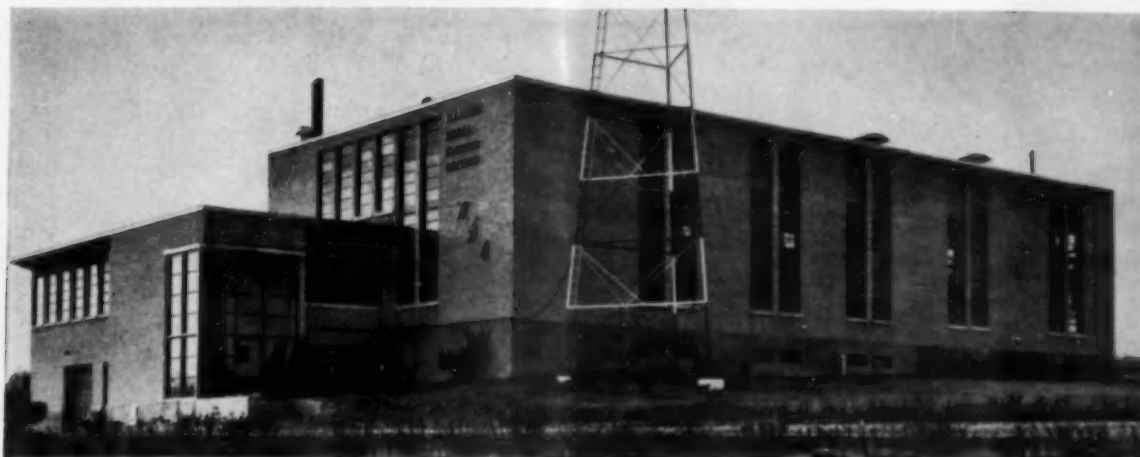
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and other models

336-R

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN **Railway Division**



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Ross Exchangers join Nordberg Diesels in around-the-clock service for rural Illinois

Progressive farmers in West Central Illinois are putting electricity to work on a large scale, both at home and on the farm. Not only do their houses abound with modern appliances, but they have found that it pays to dry corn and even air-condition pig houses with electricity.

To meet the great demand for moderately priced electrical power, the Illinois Rural Electric Company recently expanded the generating plant pictured above at Pittsfield. Two Nordberg 3870 hp Dualfuel engines, each driving a 3000 KW generator, were installed.

On this tough, demanding job where dependable lubrication is a "must," Ross Exchangers have been selected to control lube oil temperatures. Power generation is kept at a peak and down time avoided, because moving parts receive their full share of properly cooled lube oil at all times.

Where ruggedness and high thermal efficiency are top requirements, you'll find Ross Exchangers regularly at work, cooling oil, water, air and gas on all types of prime equipment. Of durable construction, they're completely pre-engineered, fully standardized, and available in a wide range of sizes.

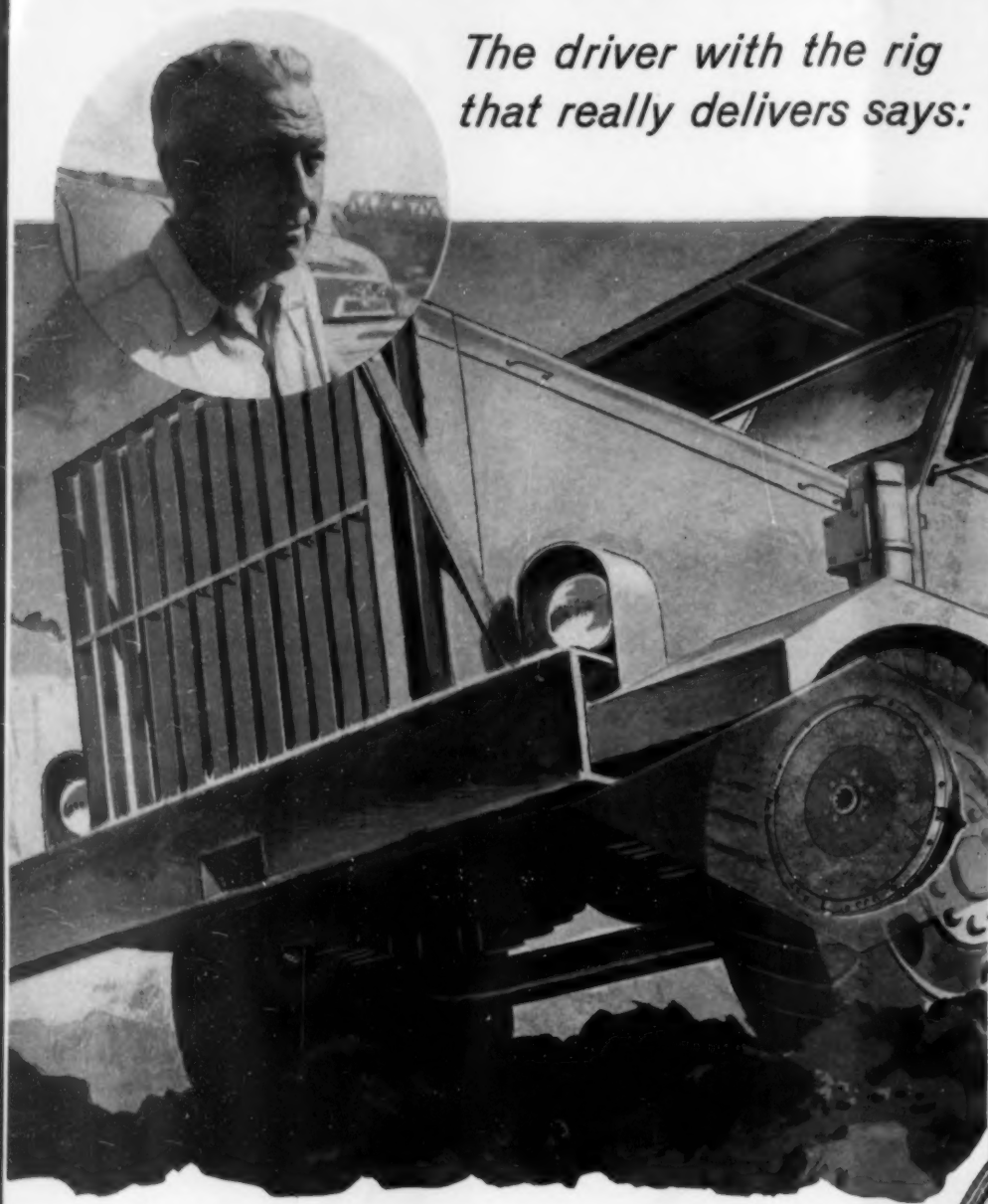
Learn how Ross Exchangers can meet your heat transfer requirements by requesting Bulletin 2.1K5 and consult with a Ross sales engineer. Ross Heat Exchanger Division of American-Standard, Buffalo 5, N. Y. In Canada: American-Standard Products (Canada) Limited, Toronto 5, Ont.

ROSS HEAT EXCHANGER

Division of AMERICAN-STANDARD



*The driver with the rig
that really delivers says:*



**"your
diesel
will do
more
with a
Spicer
H-D
CLUTCH!"**

MASSIVE construction . . . materials of exceptional durability . . . and efficient design are outstanding Spicer Heavy-Duty Clutch features:

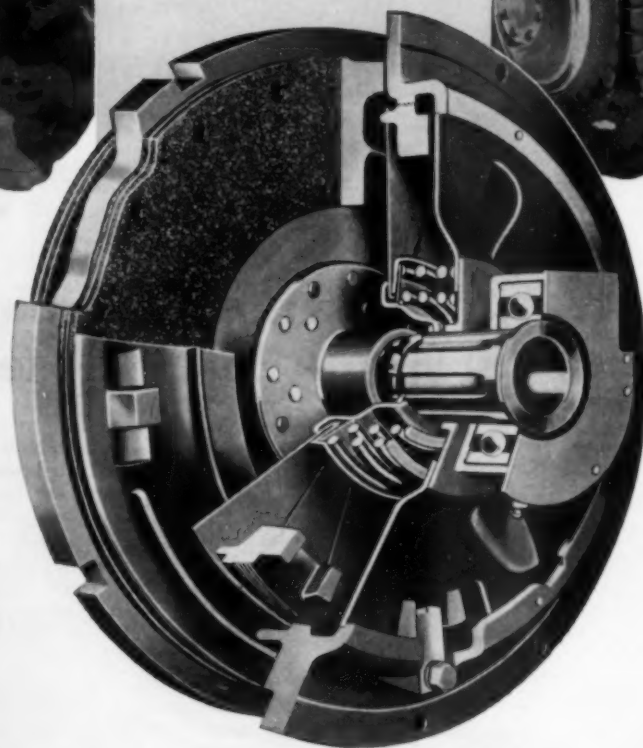
RELEASE PARTS WITH CLUTCH—The unit is complete with Release Bearing Assembly, Release Yoke and Cross Shafts ready for hookup to pedal linkage. No further engineering or procurement is required by purchaser.

LOWER HEAT ON SPRINGS—There is no direct contact between pressure springs and pressure plate, therefore, springs will not take a set and lose pressure due to heat.

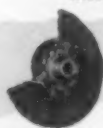
REDUCED FRICTION—The knife edge design of the fulcrum points reduce friction which shows up as less pedal effort to release clutch.

BUILT-IN PARALLELISM—Multiple levers and central springs assure uniform pressure around entire circumference of pressure plate regardless of wear or adjustment.

Ask Dana engineers to help meet your particular power transmission requirements.



Spicer Clutch Driven Disc Types to Meet Every Need



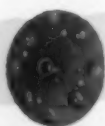
Damper Type



Riveted Facing Type



Bonded Facing Type



Ceramic Facing Type



DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merrifon, Ontario



AN ENGINE AS MODERN AS TODAY

The ALCO 251 diesel is modern for good reasons. The first: To save you money. ALCO engineers designed this engine with up-to-date materials, lowering maintenance and slashing weight. Through modern turbocharging and fuel injection they endowed it with more horsepower — reliable horsepower — to drive pumps, compressors, generators, shafts efficiently and economically.

All this means that you can install ALCO engines inexpensively. Heavy costly foundations, grouting, are unnecessary. It means, too, that maintenance costs are lower because modern materials wear longer, and the 251 diesel's design lets your maintenance people get into the engine faster. Replacement parts are readily available from ALCO's six regional warehouses.

ALCO can tell you much more about how the 251 diesel compares to "cast-iron" engines. Contact your nearest ALCO sales offices, or write Transportation Products, Dept. TR-5, P. O. Box 1065, Schenectady 1, N. Y.

Condensed Specifications* for ALCO 251 Diesels

| No. Cyl. | Bore and Stroke (in.) | RPM Range | SHP Range | Approx. Wt Dry (lb) |
|----------|-----------------------|-----------|-----------|---------------------|
| 6 | 9 x 10½ | 950-1000 | 550-900 | 22,100 |
| 12 | 9 x 10½ | 330-1000 | 1100-1800 | 32,650 |
| 16 | 9 x 10½ | 350-1000 | 1470-2400 | 42,000 |

*DIN standards

ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

*Locomotives • Diesel Engines • Nuclear Reactors
Heat Exchangers • Springs • Steel Pipe • Forgings
Weldments • Oil-Field Equipment*

The Engineer's Field Report

CASE HISTORY
RPM DeLo Oils
LUBRICANT
McGrew Brothers
FIRM *Medford, Oregon*

Logging trucks work 4 years in mud, dust, and snow without a single bearing failure



FROM LOGGING SHOW TO MILL is a rough 40 miles for McGrew Brothers fleet of B-61 Mack trucks. Four units like one above haul 20-ton payloads through mud, deep dust, or snow, 12 hours a day, five days a week. Mr. E. E. McGrew, partner in the firm, says, "Our trucks take a real beating. But RPM DELO Special Lubricating Oil helps us hold maintenance and replacement costs to a minimum. In the four years we have used this oil, we have never lost a bearing." "RPM DELO" Special is also used in all other equipment—four pickup trucks, two crew wagons, two water wagons, two loaders, and four Caterpillar-built tractors; three D-8's and a D-7. One of the D-8's went 5,000 hours before

overhaul and, after inspection, four of original pistons were put back in service. Mr. McGrew designed unique push-arm rig (above), used to unload trucks and stack logs on cold deck.



REGISTERED "RPM DELO" REG. U.S. PAT. OFF.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps parts clean

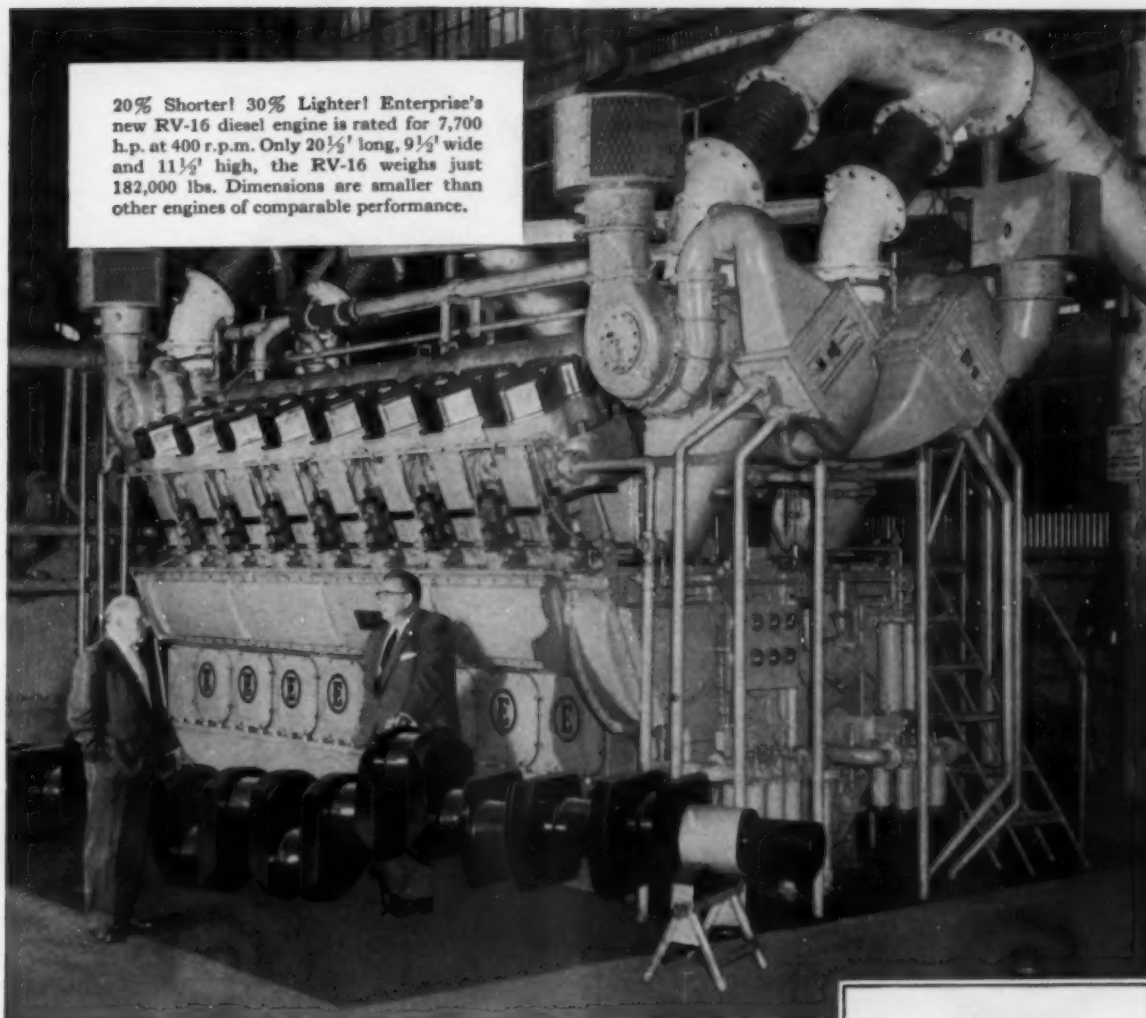


Inhibitor resists foaming

Metal-adhesion qualities keep oil on parts in running or idle engine

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

20% Shorter! 30% Lighter! Enterprise's new RV-16 diesel engine is rated for 7,700 h.p. at 400 r.p.m. Only 20½' long, 9½' wide and 11½' high, the RV-16 weighs just 182,000 lbs. Dimensions are smaller than other engines of comparable performance.



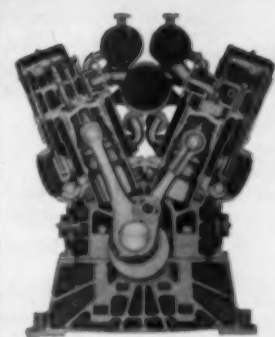
Enterprise Chooses KOPPERS Piston Rings Exclusively for RV-16

Prototype of a new line of industrial diesel engines, the RV-16, built by Enterprise Engine & Machinery Co., of San Francisco, is designed for such rugged operations as delivering main propulsion in towboats and seagoing freighters, or supplying power for pumping stations or electric generation.

As many other leading manufacturers have done, Enterprise has selected Koppers Piston Rings exclusively. Koppers wide range of types and sizes... variety of material selection... control of material quality... close tolerance performance... rigid standards of inspection—all contribute to Koppers leadership in the field of industrial piston and sealing rings, making Koppers

the most dependable source of supply.

If you have a problem of ring application, avoid further needless expense. Take advantage of Koppers experience, research facilities and craftsmanship. Write for information today. KOPPERS COMPANY, INC., Piston Ring and Seal Department, 1410 Hamburg Street, Baltimore 3, Maryland.



Cutaway shows internal design of the RV-16



AMERICAN HAMMERED
Industrial Piston Rings

Engineered Products Sold with Service

**With 30 to 50% fewer moving parts,
the Allis-Chalmers diesel
in this shovel...**



...puts more power to work digging and loading

THERE IS UNUSUAL SIMPLICITY in Allis-Chalmers engines. The Allis-Chalmers diesel in the shovel shown working above, for instance, *has 30 to 50 percent fewer wearing parts than competitive engines!*

THAT MEANS LESS WEAR . . . LESS THAT CAN GO WRONG when parts are fewer and stronger. Your equipment keeps working; you do more digging and loading.

MORE POWER GOES TO WORK with Allis-Chalmers engines — not only because there are fewer moving parts, but because more efficient combustion means maximum power from the fuel.

You can have this simplicity, economy and durability in Allis-Chalmers engines of *any* size or type, 9 to 516 hp — *any* fuel, LP or natural gas, gasoline or diesel — for *any* application. See your Allis-Chalmers dealer for full information. Allis-Chalmers, Buda Division, Milwaukee 1, Wisconsin.

BC-7A

ALLIS-CHALMERS

Engineering in Action

Neodesha packs 1-2 performance punch

1 | *Nordberg Diesels* 2 | *STANODIESEL Oil M*



Operator J. N. Finkinbinder (left) and Everett Powell, Neodesha Superintendent of Electric and Water Plants, adjust rocker arm assembly of Nordberg Dualfuel Engine. Engine operated 40,431 hours before overhaul, carrying about 90% of load. All engines in service at Neodesha are Nordberg's. All use Standard Oil's STANODIESEL Oil M.



Finkinbinder and Powell inspect oil filter used for filtering STANODIESEL Oil M used in all six Nordberg Diesels at Neodesha, Kansas, power station.

Quick facts about STANODIESEL OIL M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by using economy fuels.
- Maintains film on difficult to lubricate parts.
- Eliminates spark plug fouling in spark-ignited gas engines and reduces combustion chamber ash and deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

The city of Neodesha, Kansas, has six Nordberg engines in service. They have operated more than 400,000 hours on Standard Oil diesel lubricating oils. Here is the case story of one of these engines. The performance of this engine is typical.

In 1952, the city of Neodesha installed a 1,750 hp., 1230 kw., Nordberg Dualfuel engine. During the period between February 14, 1952, when the engine went into service, and March 1, 1956, the engine ran 34,370 hours out of a possible 35,784. This is 96% of the engine's total installed hours. In this time, not even a piston or cylinder head was removed. So good was the performance of this engine using STANDARD HD Oil that when Standard introduced an improved diesel oil—STANODIESEL Oil M—in February, 1955, this engine was converted to this new oil.

There is more to the story. The engine continued in service to 36,223 hours when No. 7 cylinder liner was pulled to put rubber gaskets on liner

to stop water leakage. At this time, No. 7 piston and liner were checked. Liner wear averaged only 0.0045 inches. The top ring showed an average wear of 0.016 inches. The No. 2 ring was 0.020 inches. Little, if any, wear was indicated on other rings. Now, at 40,431 hours, the engine is down for overhaul of turbocharger and to have valves ground. Bearings were found in excellent condition. No pistons are to be pulled.

Get more facts about STANODIESEL Oil M by calling the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

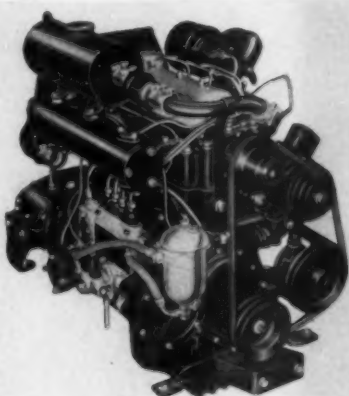


STANDARD OIL COMPANY
(Indiana)



MERCE Diesel

These engines — the world's finest diesels — are now available for sale through the Utica-Bend Division of the Curtiss-Wright Corporation, to manufacturers and users of industrial, marine, construction and materials handling, trucks and busses, railroad, electrical generating, agricultural, oil and gas equipment. . . The Utica-Bend Division will both import and manufacture the Mercedes-Benz diesels, ranging from 36 to 3000 h.p., together with components, spare parts, accessories and fuel injection systems. Mercedes-Benz diesels are noted the world over for their high power to weight ratios and are designed



MODEL OM 636



MODEL OM 321

| MODEL NO. | NO. OF CYL. | RATING* HP @ RPM | DISP. CU. IN. |
|------------|-------------|---------------------|------------------|
| OM 636 | 4 | 36 @ 3000 | 10 |
| OM 312 | 6 | 79 @ 2400 | 28 |
| OM 321 | 6 | 96 @ 2600 | 31 |
| OM 315 | 6 | 123 @ 1800 | 50 |
| M 204 B | 4 | 129 @ 1200 | 78 |
| †MB 846 A | 6 | 242 @ 1500 | 123 |
| †MB 846 Ab | 6 | 320 @ 1500 | 123 |
| MB 836 B | 6 | 360 @ 1500 | 180 |
| MB 846 Db | 6 | 375 @ 1500 | 123 |
| MB 837 A | V-8 | 451 @ 2000 | 182 |
| MB 836Bb | 6 | 513 @ 1500 | 180 |
| MB 837 Aa | V-8 | 564 @ 2000 | 182 |
| MB 836 Db | 6 | 666 @ 1600 | 180 |
| MB 820 B | V-12 | 718 @ 1500 | 361 |
| MB 820 Bb | V-12 | 1026 @ 1500 | 361 |
| MB 820 Db | V-12 | 1385 @ 1500 | 361 |

Ab TURBOCHARGED

Db HIGH OUTPUT TURBOCHARGER

*INDUSTRIAL INTERMITTENT

**Other Mercedes-Benz Diesel Engines Available In
12 And 20 Cylinders Up To 3000 Horsepower**

AD NO. 29-2

E DES-BENZ Engines

and built to the highest standards of quality, performance and economy. . . Unusually long engine life and dependable operation under extreme climatic conditions are made possible by their exclusive design. . . The sales and service program for Mercedes-Benz diesels, now being established by Utica-Bend, provides for sales representation in key areas and facilities for servicing of engines and distribution of spare parts to assure full maintenance of equipment in the field. . . For further information, write to: UTICA-BEND DIVISION, CURTISS-WRIGHT CORPORATION, UTICA, MICHIGAN.




MODEL OM 312



MODEL OM 315

| DISPL. CU. IN. | WEIGHT LBS. | APPROXIMATE DIMENSIONS | | |
|-------------------|----------------|------------------------|-------|--------|
| | | LENGTH | WIDTH | HEIGHT |
| 108 | 400 | 2'5" | 1'9" | 2'6" |
| 280 | 808 | 3'1" | 2'2" | 3'5" |
| 311 | 784 | 3'1" | 2'2" | 3'5" |
| 505 | 1775 | 4'6" | 2'3" | 3'11" |
| 789 | 2715 | 4'9" | 2'7" | 3'11" |
| 1230 | 4075 | 6'2" | 2'8" | 5' |
| 1230 | 4298 | 7'2" | 3'1" | 5'2" |
| 1806 | 3560 | 6'4" | 3'5" | 4'7" |
| 1230 | 4266 | 7'0" | 2'10" | 5'2" |
| 1823 | 2970 | 4'1" | 3'5" | 3'6" |
| 1806 | 4080 | 7' | 3'5" | 5'4" |
| 1823 | 3080 | 4'2" | 3'5" | 3'8" |
| 1806 | 4290 | 7'6" | 3'5" | 5'4" |
| 3613 | 5510 | 8' | 4'5" | 6'1" |
| 3613 | 6116 | 7'11" | 4'5" | 6'5" |
| 3613 | 6612 | 7'11" | 4'6" | 6'1" |

Aa MECHANICAL SUPERCHARGER † AVAILABLE IN HORIZONTAL CONFIGURATION

UTICA-BEND DIVISION
CURTISS-WRIGHT 
CORPORATION • UTICA, MICHIGAN

Florida Diesel News

By Ed Dennis

A 100 KW Allis Chalmers generator, driven by a model 3-268-A General Motors 150 hp diesel, provides electric current for the control systems on the Navy YAG-37 experimental ship. Four turbo-prop aircraft engines, mounted on

deck, provide mobile power for this converted Liberty vessel as the regular propeller was removed. Installations were made by Rawls Bros. Shipyard, Jacksonville, Florida.

SHELLEY Tractor & Equipment Co. supplied the model D397 turbocharged Caterpillar diesel engine for the new 70 x 19 ft tug being built by Dade Dry-

dock for Backus Towing Co. Rated 550 maximum hp, it will have 4.22 r&r gears.

ELLIS Diesel Sales & Service of Ft. Lauderdale repowered the Huckins built 43 foot yacht *Saleran*, owned by L. J. Plym of Hillsboro Beach, with two General Motors turbocharged, lightweight, 4-71 diesels. They have a basic horsepower rating of 171 at 2300 rpm.

CAPELLETTI Bros. of Hialeah, took delivery of a model 543 Bucyrus Erie 3 yd dragline powered with a model 6DC1879 Allis-Chalmers (Buda) diesel engine. This 6 $\frac{3}{4}$ x 8 $\frac{3}{4}$ in. diesel is rated 281 hp at 1200 rpm. It has Twin Disc clutch and De Luxe oil filters.

CUMMINS Diesel Engines of Florida, repowered the tug of the Turner Bros. of Naples, with a model NHMS 600 diesel and Capitol 3:1 r&r gears. This 6 cyl diesel engine is rated 275 hp at 2100 rpm. The Turners also operate several other Cummins dieselized vessels.

MERCEDES-Benz Diesel distributors in Miami installed a model OM 636 Engine in Warren Bailey's 38 ft sailboat. This installation included 2:1 Paragon r&r gears and is rated 37 hp.

THERE is a unique installation on the twin screw 150 ft *Haiti Trader* of Port au Prince, Haiti. A 6 cyl, model 148 DKBS, Waukesha diesel, rated 150 hp, drives one propeller while a model MRDB8R 150 hp Superior diesel, with Snow Nabstedt r&r gears, drives the other propeller. Two 20 kw Hercules diesel generating sets were also in the engine room.

FROM TAMPA, three model DC75 Autocar hi-way tractors with model HRFB-600 Cummins, 180 hp diesels, were delivered to Chester Fosgate of Orlando while Bill Dorn of the same city received a Diamond T with a JT 600 Cummins and an R45 Fuller transmission.

MODEL 135 DKB Waukesha diesels, rated 100 hp at 1600 rpm, were installed in the three #175 A Michigan front loaders delivered to R. H. Wright Construction Company of Fort Lauderdale, Fla.

THE *Lillian*, an ex-navy L. C. L., is now a West Indies freighter owned by the Disanca Co. of Caracas, Venezuela. Conversion included an electric elevator for the 38 cars it will carry along with general cargo. It is powered with two Cummins diesels of 200 hp each and Capitol 1.5:1 r&r gears plus 46 in. variable pitch propeller and there are two 20 kw Hercules diesel generating units in the engine room.

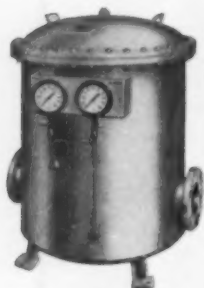
J. FRANK Knorr Co. supplied the model 6DA-273 Allis-Chalmers (Buda) diesel, 70 hp at 1800 rpm, to run the hydraulic motor for the cutter head on the Grims dredge at Delray Beach. The main engine is a model 6DA844 Allis-Chalmers diesel.

TWO 40 ft Sports Fisherman are being constructed at Chris Boat Works in Mi-

The INSIDE story of...

Fulflo Filters

For Continuous Micronic Clarity



Inside every Fulflo Filter is the *exclusive* Honeycomb Filter Tube... engineered in a wide range of positively controlled densities... to provide true *depth* filtration at minimum pressure drop. You get the exact degree of micronic clarity you want for both fuel and lubricating oils.

Fulflo Filters are designed for all sizes of stationary engines, mobile equipment, and for bulk filtration. They may be used on the pressure or suction sides of fuel lines. Leading engine manufacturers specify FULFLO for primary and secondary fuel and lubricating oil.

For *surface* full-flow filtration, the CFC Flo-Pac Filter is offered in a variety of models using 1 to 36 cartridges of impregnated, pleated paper.



CFC

CFC HONAN-CRANE AND MICHIANA FILTERS FOR BY-PASS APPLICATIONS

Where by-pass filtration is indicated, CFC Honan-Crane Filters give you a wide choice of models. Multi-Cartridge Filter (illustrated) offers a choice of six types of interchangeable cartridges — inert media for solid contaminants, or Cranite (fuller's earth) for removal of both solid and dissolved impuri-

ties. CFC Michiana Filters, with "throw-away" or repackable elements, provide especially low-cost diesel filtration.

Prolong engine life by reducing wear on injectors and bearings. For engineering assistance or technical literature, write Department DS

Micro-Fine Filtration
for Low Cost Clarity



COMMERCIAL FILTERS CORPORATION

MELROSE 76, MASSACHUSETTS

Plants in Melrose, Massachusetts and Lebanon, Indiana

FULFLO FILTERS WITH GENUINE HONEYCOMB FILTER TUBES FOR CONTROLLED MICRONIC CLARITY • CFC MULTI-CARTRIDGE OIL FILTERS
PURIVAC INSULATING OIL CONDITIONERS • DRI-PURE WATER-OIL SEPARATORS • PRE-COAT FILTERS • MAGNETIC SEPARATORS
AUTOMATIC TUBULAR CONVEYORS • COOLANT CLARIFIERS

ami, for undisclosed owners. Each are being powered with two GM 4-71 inclined turbocharged diesel engines and Paragon r&r gears, Perry filters in the cooling system and 3 kw Onan diesel generating sets with Maxim 2½ M4B silencers.

AT JACKSONVILLE, the Detroit Diesel Div. GM supplied the 6071-A diesels and GM hydraulic r&r gears for the 62 foot shrimp vessels *Kelly K* of Harlinger, Texas and the *Gulf Trader* of Port Isabel, Texas. Both were constructed by Diesel Engine Sales of St. Augustine, Florida.

TWO Allis-Chalmers tractors model HD 21, with hydraulic dozer blades, went to Sunshine Builders for use in a rock pit on Route #84 and one to the Fern Crest Quarries. Both are in Fort Lauderdale, Florida.

GETTING a face-lifting job, at the Miami Shipbuilding Corp., is the 140 ft steel *Alaska* of the U. S. Fish & Wildlife Comm. For propulsion there is a model DMG36 Enterprise diesel engine rated 600 hp at 400 rpm.

A CUMMINS diesel engine model HR MS 600, having 225 hp at 1800 rpm, was installed in the newly launched shrimp trawler *Nicky C* by the Booth Fisheries of Campeche, Mexico. Seventeen trawlers were powered with Cummins diesels by this firm in the last year.

DADE Drydock is building a 44 ft scow type dredge for a construction firm in Venezuela. A GM 3-71 diesel will be used for the cutter head and the 10 in. pump will have a D353 Caterpillar 293 hp diesel for power.

ANOTHER 145 ft steel menhaden vessel was launched for the gulf fishing trade. Built for the Castigliola Shrimp Co., the *Lois-C* has two GM 12-2206 tandem diesels rated 540 hp each with Falk 3:1 r&r gears and GM power take off.

A PETTER diesel was installed in the 67 foot shrimper *Michael Edwards* of Tampa for auxiliary purposes. The main engine is a D342 Caterpillar diesel.

AN International UD24- 6 cyl 180 hp diesel engine is being used in road tamper and oiler by R. H. Wright of Ft. Lauderdale. For maneuverability, a TD 18 International crawler tractor is used.

Nordberg Appointments

Appointment of Robert F. Gibson as Manager and E. Ray Hester as Assistant Manager of the Installation and Serv-

ice Department is announced by R. W. Bayerlein, Vice President, Engine Division, Nordberg Manufacturing Company. Mr. Gibson has served as Assistant Manager of the Department since December, 1951 and he recently completed his eighth year with the Company. For three years prior to joining Nordberg, he was an engineer consultant to municipalities and industry for the applica-

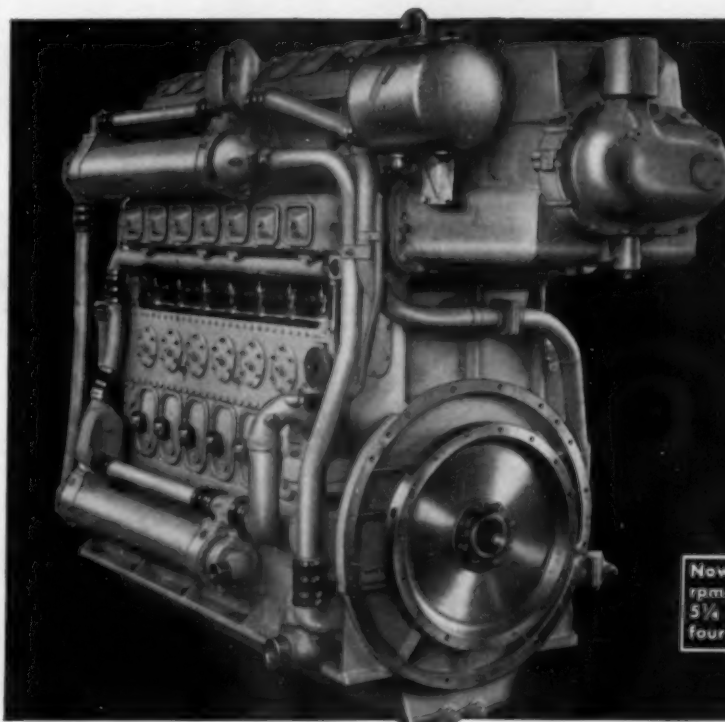
tion and servicing of diesel engines. Gibson is a native of Georgia and graduated from Americus A & M College. He spent six years in the U. S. Maritime Service and still has his Unlimited Chief Engineers License. Gibson's naval experience also includes more than 10 years service with the U. S. Navy as an engineering officer and as a civilian technician, supervising the installation

of diesel marine engines. Ray Hester recently completed his 21st year with Nordberg. He assisted in the administration of the Department for the past eight years and previously supervised many engine installations. Hester also did field test work and has experience on the engine erecting and diesel test floor of the main Nordberg plant in Milwaukee.

Where performance is the measure

F-M Power is the standard

NOW 7 IMPROVEMENTS in the Model 38F O-P Diesel



increase rating to
80 horsepower
per cylinder

Now rated at 80 hp. per cylinder at 1200 rpm, the Fairbanks-Morse Model 38F 5¼ Diesel is available in sizes from four to ten cylinders.

Latest improvements in the Model 38F O-P combine to increase the rating to 80 hp. per cylinder. All 7 are thoroughly tested and field-proven—making the "Little O-P" better than ever.

- 1 One-piece piston with full floating piston pin. Mechanically simple, more reliable, lighter and still retains superior oil cooling feature.
- 2 Vertical drive through a new coupling. The O-P now has an even wider range of speed operation from idle to full speed.
- 3 Raised exhaust ports. Increases time between port cleanings and improves fuel consumption.
- 4 Alternate starting options. Now available for

all sizes: air motor start, electric start as well as distributor air start.

- 5 Engine mounted oil bath intake filters. Eliminates intake pipe and remote filter mounting with its extra structural cost . . . more self-contained unit.
- 6 Factory mounted controls for remote and automatic starting, scheduled acceleration, deceleration and stop. Meets all requirements of both air start and electric start engines.
- 7 New fuel injection pumps for improved handling of fuel at the increased rating.

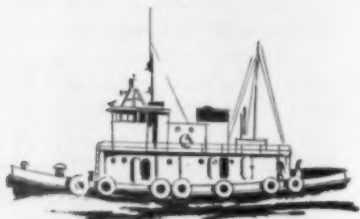
IT ADDS UP—more than ever before—to more power to you with an O-P Diesel



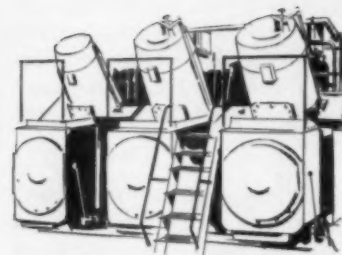
FAIRBANKS-MORSE

a name worth remembering when you want the BEST

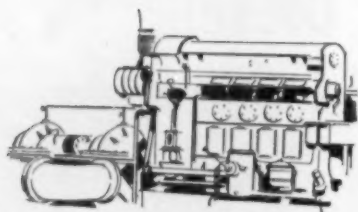
DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MAGNETOS



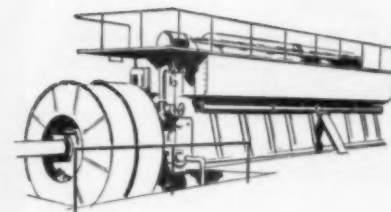
Marine



Engine compressor



Pumping



Stationary

GET THE BEST
FROM THE POWER
YOU BOUGHT...



WITH *Alnor*® PROTECTION

Accurate check of exhaust temperatures with an Alnor Pyrometer system can assure minimum fuel consumption per horsepower and long service from the power you bought—without the interruption of many common-cause breakdowns.

At a fraction of the cost of your present engine maintenance bill, an Alnor system can give you advanced warning of:

| | | |
|-------------------|----------------|------------------|
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writes:

ILLINOIS TESTING LABORATORIES, INC.
Room 508, 420 No. LaSalle St., Chicago 10, Illinois

MOBILE DIESELS FIGHT FIRES, BACKSTOP MISSILE-ENGINE TEST PITS AT ROCKETDYNE

By JAMES JOSEPH

IN a hill-top overlooking a complex of steel and concrete test stands—where rocket-engines are trial-fired—a Waukesha 100 kw diesel generator poises ready to supply security lighting to the Free World's most strategic missile engine research center. Nearby are stationed two more mobile diesel plants . . . generators which, flat-bedded to emergency duty, have helped fight brush fires and powered deep-well pumps whose water is primely essential to every rocket firing. Along more than 26 miles of roads which wind thru this, missiledom's most security-cloaked test facility, work diesel dozers—D-7s, D-8s and TD-9s. The place: 1700 canyoned acres in California's isolated Santa Susana mountains where Rocketdyne, a division of North American Aviation, Inc. test-fires liquid-propellant rocket engines destined for the Thor, Jupiter and Atlas ICBM missiles.

Rocketdyne's Propulsion Field Laboratory is a round-the-clock, 365-day a year operation. And diesel-generator sets like the three Waukeshas help to keep it that way.

"When we need emergency power," says W. C. Rich, plant maintenance foreman at the Propulsion Field Laboratory, "we need it . . . and right now." Nothing better illustrates the critical importance of Santa Susana's diesel standbys than what Rich calls "that pump trouble we had a couple of months ago." The "trouble" originated with one of the center's 10 wells, without whose water there would be no missile-motor testing.

For firings demand huge gallonages of water to quench the flames of propulsion. In engine testing, water is almost as important as propellant, the exotic and volatile fuels which make these

the most powerful engines in all the world. 15,000 to 50,000 gallons of water are needed for every test. Routinely, a big missile engine is lifted into its test stand. The engine is fired . . . simulating the test-runs common to all aircraft engines, be they piston or turbo-jet. But with missile engines there's a difference. Tho the engine will run but once in line of duty—when en route to target—it must perform perfectly, if only that once. Built at Rocketdyne's Canoga Park, Calif. plant (and elsewhere), missile engines are brought to Santa Susana for firing. And it's water, from the test center's deep wells, which quenches their exhaust flames. Santa Susana's weekly water needs run to millions of gallons. 2,000,000 gallons go into the center's domestic system. The rest is routed from hilltop gravity tanks to the test pits where, flooding over steel flame deflectors, it cools the engines' fiery exhausts.

Power developed by this rocket engine is measured on a static test stand at Rocketdyne . . . engine's exhaust quenched by water. Waukesha portable diesel sets have, in emergencies, supplied power to deep-turbine pumps supplying the water.

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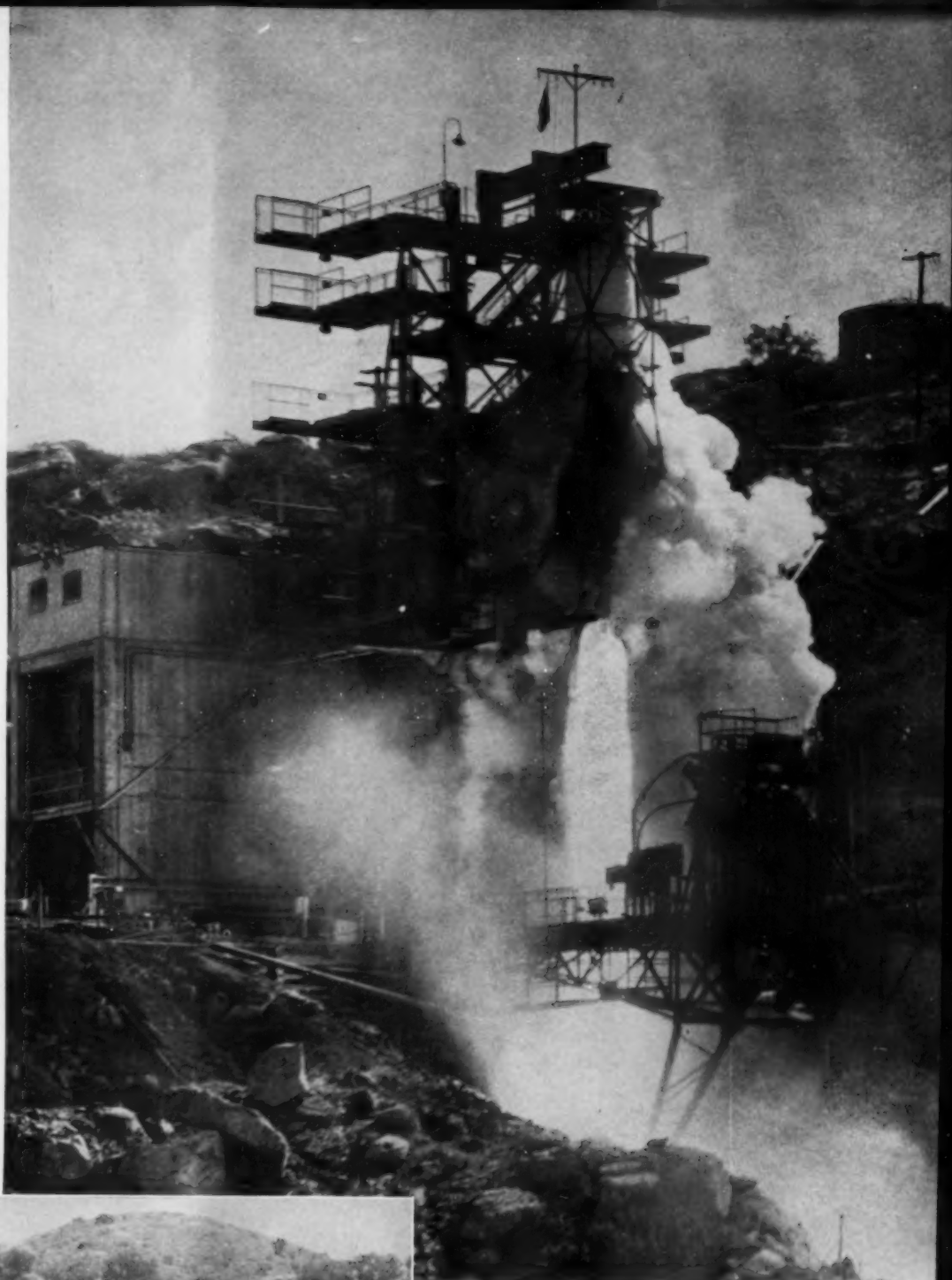


The "trouble" began one day some months ago when one of Santa Susana's all-important wells ran into trouble. It had to be shut-down. Nearby was another well. It'd just been drilled and installed with a deep-turbine pump. But the pump wasn't yet wired for power. Nor was it piped into the gravity quenching system (some 22 storage tanks, ranging from 50,000-100,000 gallons, their total capacity 1,000,000 gallons). From a test pit came the order, "we've got to have water . . . and right now." Rich called out a flatbed truck. The truck, loaded with a Waukesha 100 kw diesel standby power plant, trundled to the new well site. Quickly, plant maintainers hooked it into the turbine pump. But even more pump capacity was needed. So Rich called out a firetruck, used its pump as a booster. His men laid three-quarters of a mile of 3-inch fire hose to a hilltop storage tank. And within an hour the test-pit was back on firing schedule. Says Rich, "we ran that way—diesel operated—for a week, until we'd laid pipelines and hooked into a power line. That test stand? It fired on schedule." Twice last year, when forest fires fingered menacingly across the Santa Susana mountains (the fires' origins had nothing to do with rocket engine testing), Rich had his Waukesha diesel plants ready . . . just in case.

"We had the diesels warmed and ready . . . tho their jacket water is kept warm around the clock. This time, tho, we had our electrical lines laid be-

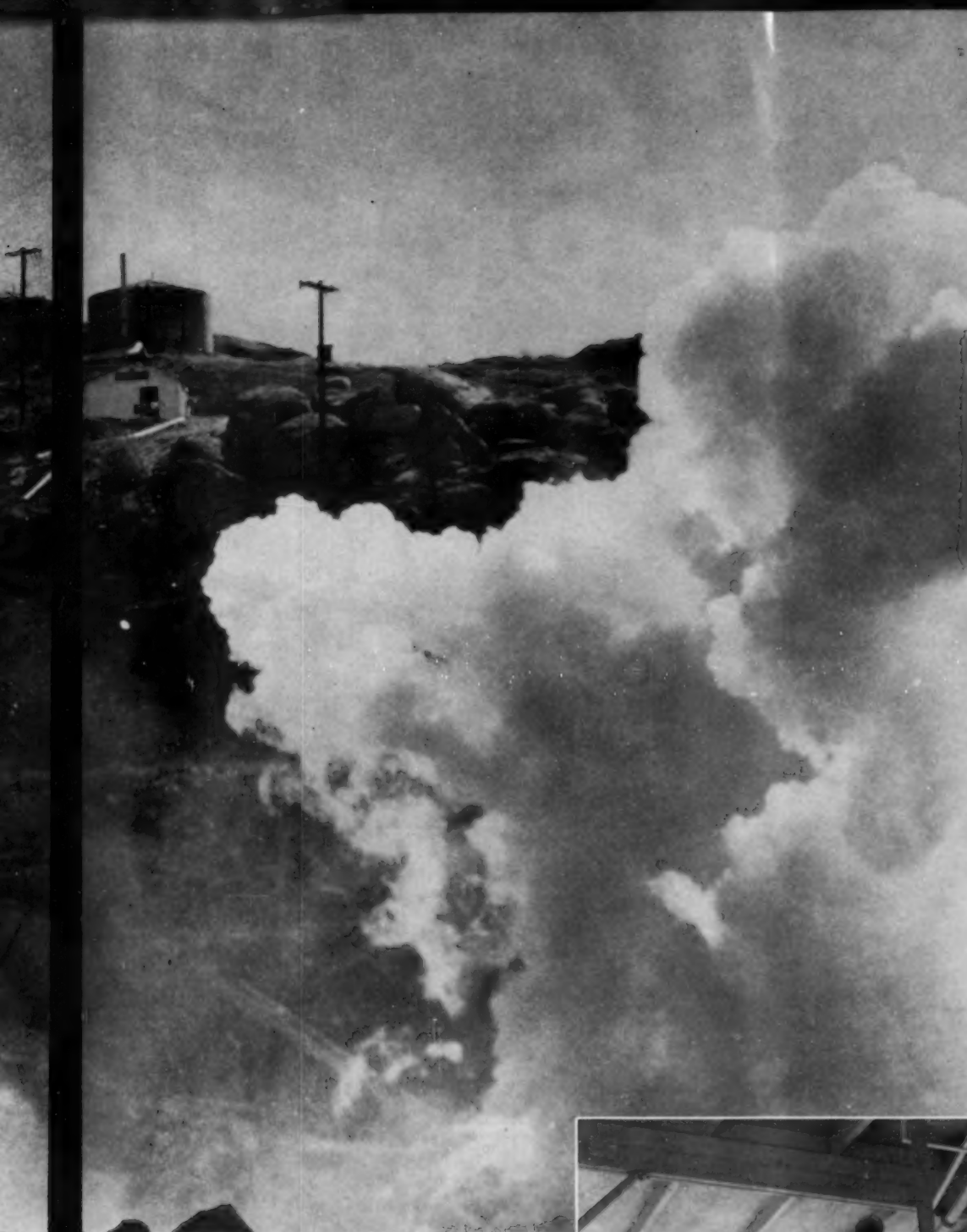
At Rocketdyne behind test stand looms storage tanks, for water, . . . and nearby, deep wells. Lighting circuits to test stands are on the security circuit, monitored by Waukesha diesel standby units.

Scraper is one of several dozen diesel units which maintain Rocketdyne's 26 miles of roads.



cause the fire was threatening our main transmission line, the 12-miles of 4160 volt line that powers the test center." Right now—as since 1951—the Waukesha generator sets backstop the test center's 10 wells and their 25 to 100 hp deep-well turbines.

A diesel package, trucked to any well head, takes over in emergency. Perhaps more important, the standbys monitor the center's miles of security lighting. The security circuit includes lights perimetering the test sites. Involved, too, are other vital points: the maintenance shops (whose job it is to get the test sites back in operation following an electrical outage); the big plant which manufactures highly volatile liquid oxygen (LOX), and lighting at the center's two electrical substations. The Waukeshas drive Delco generators rated 100 kw, 125 kva, 60 cycle, operating at 1200 rpm, loaded. Four batteries supply start-up



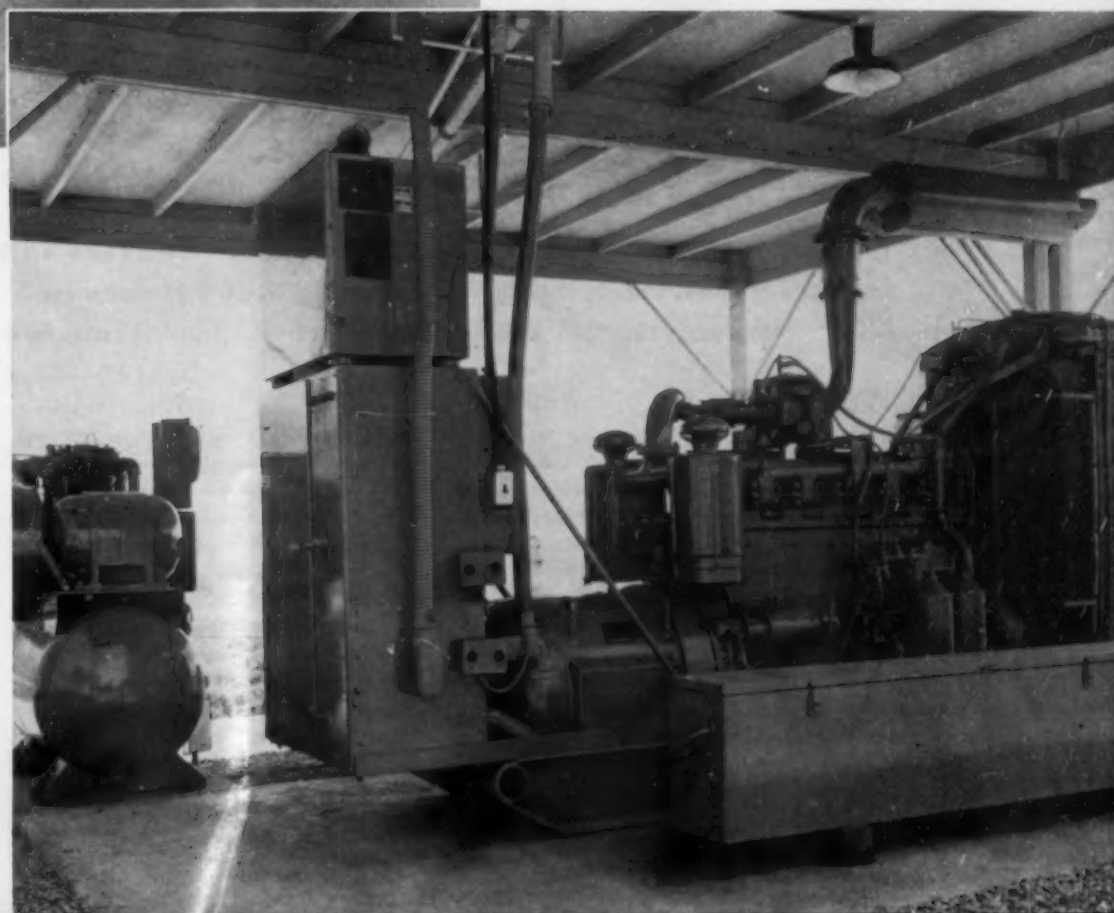
miles rock and oil and about 12 miles unimproved—are trafficked by some 2700 technicians and engineers who operate the test pits and haunch drawing boards in 135 buildings (totalling 2,500,000 sq ft). Maintenance foreman Rich finds his duties about as diversified as any plant engineer in U.S. industry. For his "plant" is highly decentralized, each test stand isolated from the next by canyons.

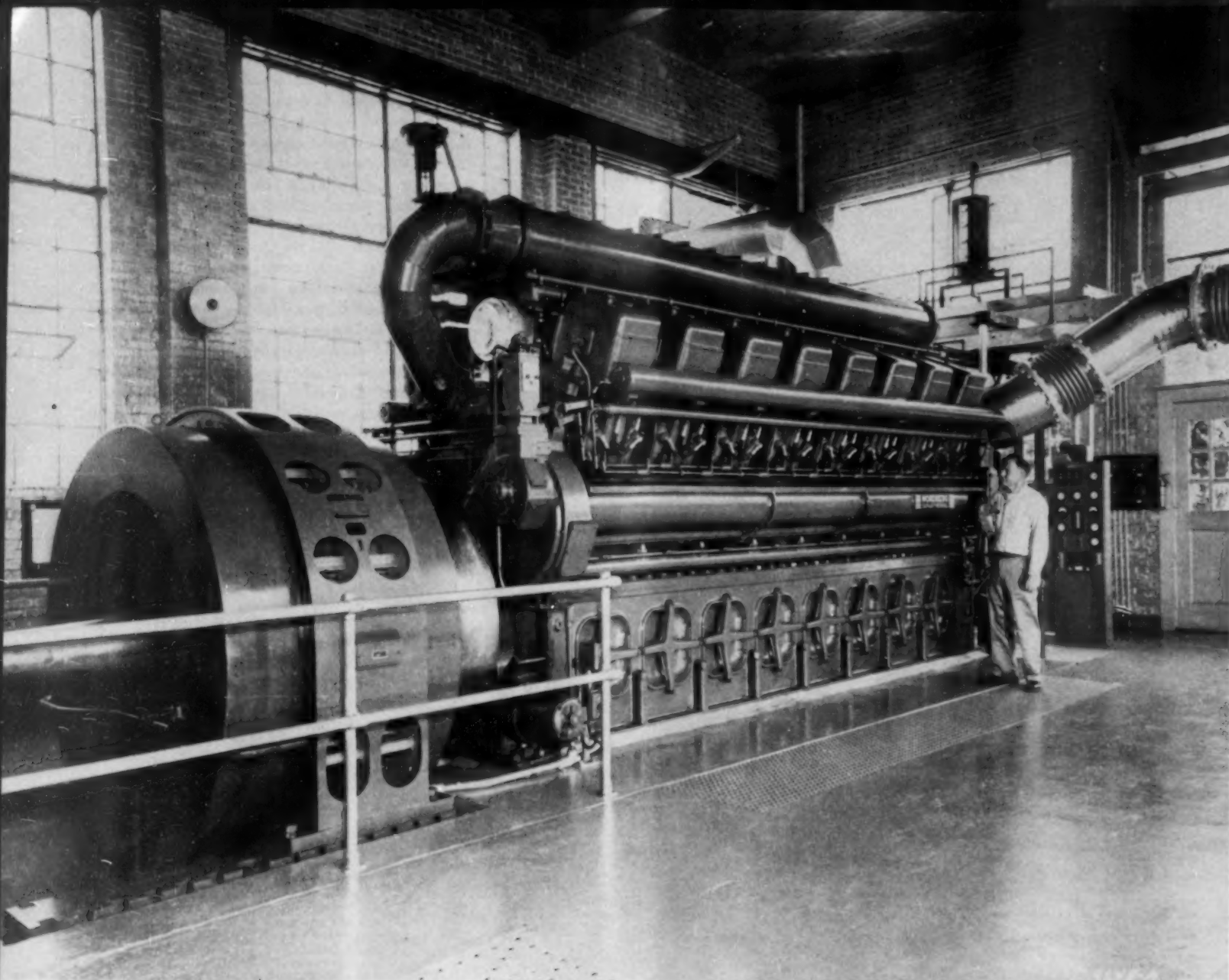
His big staff—128 maintainers on three shifts—man the road-running dozers, run check on power lines, operate two shops where 207 pieces of mobile equipment—including the diesel standbys and road machinery—are overhauled. The center's diesels are also work-horses in yet another phase of operations: water conservation. Dozers have helped to build a series of 12 catch basins and dams. These store water for the test pits, enable Rocketdyne, thru a contaminated storage system, to reuse 60 per cent of the millions of gallons weekly used for flame quenching. 40 per cent of the gallonage is lost in the quenching process. The remainder flows to catch basins. From here, below water-level skimmer pipes accumulate the run-off in a main pond from where it's pumped back to a hill top contaminated water storage system (three tanks totalling 150,000 gallons). Diesel dozers are at work now, building two more dams. That's a glimpse of diesels at work—and standby—at Rocketdyne's Propulsion Field Laboratory, the Free World's most strategic missile engine test center.

Waukesha standby diesel electric set serves security circuit at Rocketdyne. Two other units, portable, are assigned mobile emergency jobs. The Waukeshas drive Delco generators and are equipped with Elliott turbochargers; Vortox filters; American Bosch fuel system; Delco-Remy electric starters; Houdaille vibration dampeners and Young radiators.

power. Waukeshas are model WAKDS, 6 cylinder, with aluminum pistons and vibration dampener. They have a bore $6\frac{1}{4}$, a stroke of $6\frac{1}{2}$, a displacement of 1197 cu inches. They're rated 189 Bhp at 1200 rpm. Each power package is self-contained. The engines are turbocharged (Elliott model M-51), equipped with Vortox filters and installed with American Bosch fuel feeder systems (which draw from two 50-gallon drums of fuel oil). Immersion heaters maintain jacket water temperatures at "ready"—about 140-degrees F.

Says Rich, "we test-run the engines two nights a week, an hour each running. And a flatbed truck and crane stand ready, in case we've got to haul a power package somewhere." Meantime, the laboratory's dozers keep roads clear—no small job considering the rugged terrain and heavy traffic. The center's 26 miles of road—10 of them asphalt, 4.5





Newest and biggest engine in the Neodesha plant is this 3150 hp Nordberg 16 cylinder, V-type which drives a 2250 kw G. E. generator at 450 rpm. Superintendent Everett Powell inspects the Supairthermal Duafuel put on the line in September, 1956. During the Winter gas shortage, this Duafuel engine ran on oil alone and returned 15.6 kwhs per gal. of fuel at an average load of 54 per cent.

NEODESHA, KANSAS

City's Sixth Nordberg Engine Delivers 15.6 Kwhs Per Gal. Fuel; No. 5 Unit Runs 40,000 Hours in 5 Years Without Overhaul; No. 2 Ran 97.8% of Elapsed Time for 12 Straight Years

NEODESHA'S new 3150 hp Nordberg Diesel is putting some impressive figures into the record book, but that is nothing new for this Kansas municipal plant. This is the sixth Nordberg to go into the plant and it will take a lot of years to equal records set by earlier units for durability and continuous trouble-free service. The big 16 cylinder V-type Supairthermal Duafuel engine was put to work on September 7, 1956, and by April 1, 1957, had run 3,313 hours and generated 2,535,000 kwhs. The engine operated most of the time on economical natural gas fuel with a little pilot oil but was called on during the Winter gas shortage

to work as a straight oil-burning diesel. Despite a load factor that averaged a poor 35.5 per cent, the engine achieved an average fuel consumption of just 10,220 btu per kwh for the seven-month period. As load factors improved a little, the efficiencies recorded are truly impressive. In January, with the gas supply cut off, the diesel operated on oil alone for 417 hours and produced 505,000 kwhs while consuming 32,227 gal. of fuel oil. Average load was a modest 54 per cent and the engine returned 15.6 kwhs for each gallon of fuel consumed, a very satisfactory figure. This is an average of 8,333 btu per kwh. Table I gives detailed figures for this

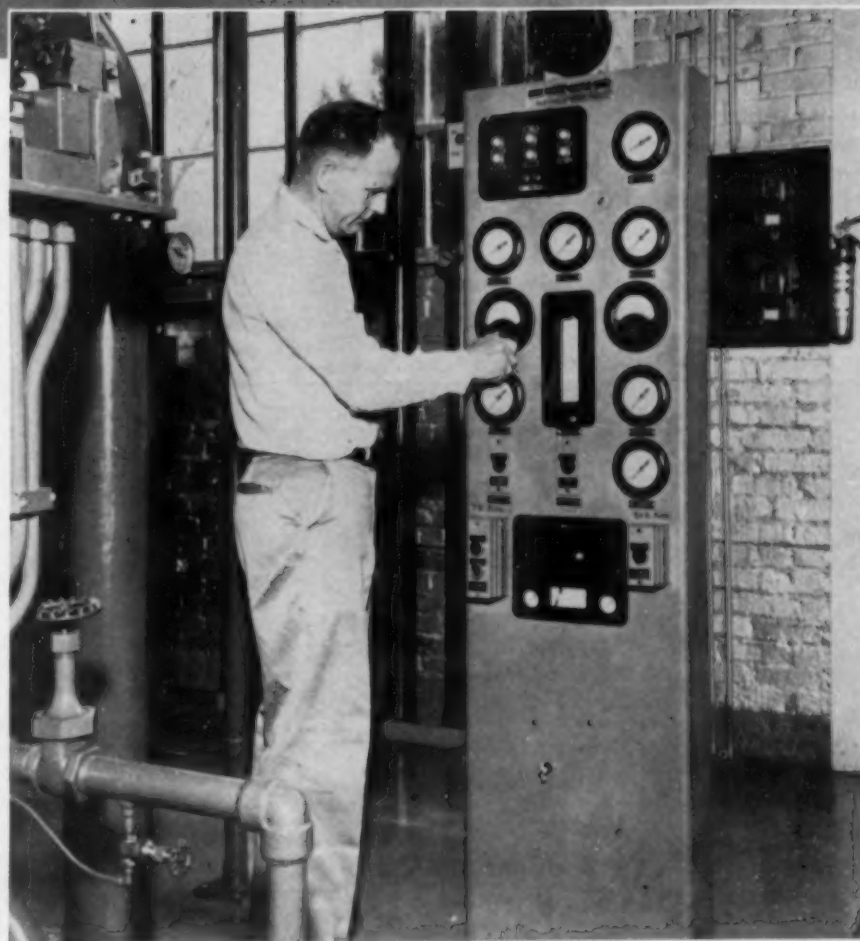
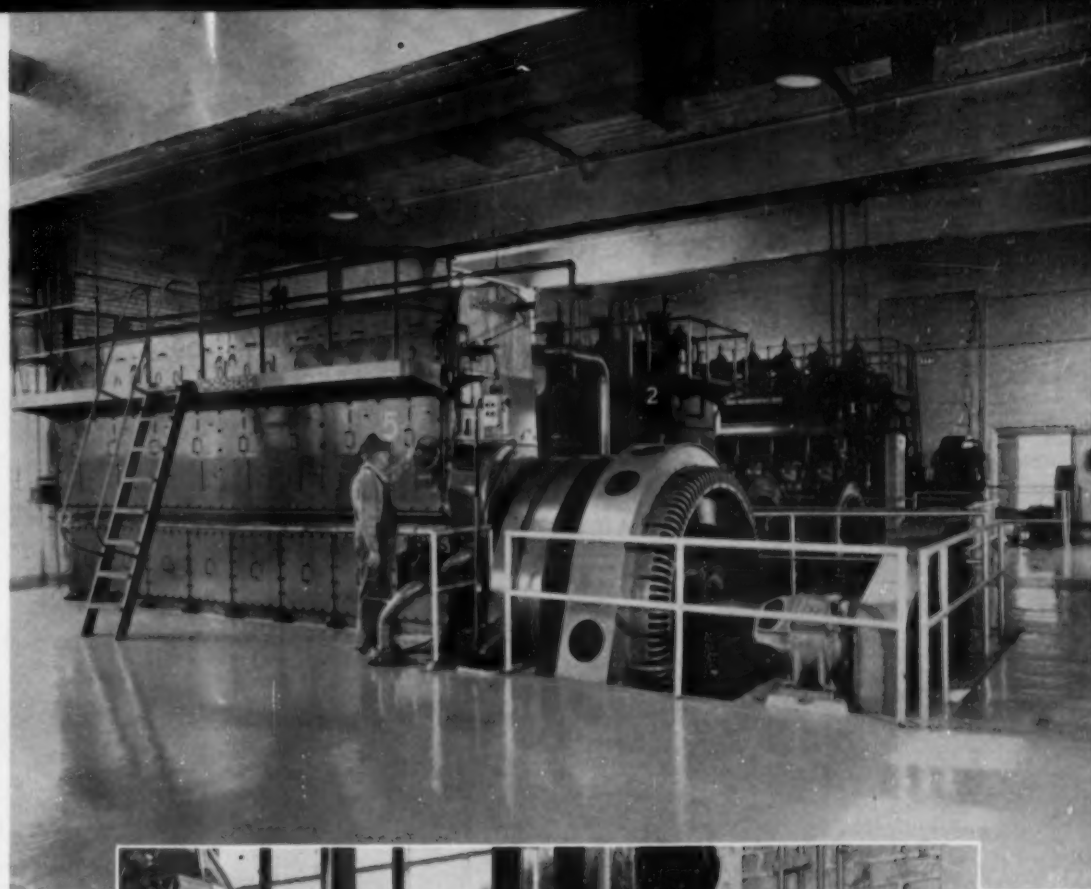
unit's first seven months of service. The big engine's economy extended to lubricating oil consumption, too. In the 3,313 hours of operation, the 3150 hp unit used just 807 gal. of lube oil, an average of 12,931 bhp hrs per gal. of lube oil.

The advent of the new engine gave Everett Powell, Superintendent of Water and Electric Plants, an opportunity to ease the load on his No. 5 unit and to check the condition of this marathon performer. This engine, a 1750 hp, four-cycle supercharged Nordberg Duafuel, was put on the line February 14, 1952, and immediately became the base load

Three Nordberg diesels that have rendered impressive service in the Neodesha plant. The No. 5 Dualfuel unit ran more than 40,000 hours in less than five years without overhaul. The No. 2 engine, installed in 1934, has run more than 116,000 hours. Operator Paul Jones has run Nordbergs for 22 years. Below: Supt. Powell checks exhaust temperature gauge on the 3150 hp Nordberg engine. The Nordberg gauge panel holds Alnor pyrometers and a Viking alarm panel.

prime mover of the plant. In the remaining 10½ months of that year, the engine worked 7014 hours out of a possible 7728, then really buckled down to serve 8705 hours in 1953, 8726 hours in 1954, 8515 hours in 1955, and 5438 of a possible 5832 hours in the first 8 months of 1956, preceding the installation of the new diesel. Thus, for 55 months, the No. 5 Nordberg was on the line 38,398 hours or 96.3 per cent of the time. For the two-year period 1953 and '54, the engine was at work 99.4 per cent of the time. On February 1, 1957, after 40,431 hours of operation, the engine was shut down for its first overhaul which must be classified as preventive maintenance. Compression was as good as ever. Pistons, liners and rings were clean and in excellent condition and not a single ring was changed. In fact, no parts required replacement. The valves were ground for the first time. The outboard bearing was adjusted. The only parts Mr. Powell services on a six-month schedule are the fuel injection nozzles. It is his practice to alternate two sets of injectors, servicing one set while the other is at work. After more than 40,000 hours, no other maintenance was required. Most plants would worry about assigning so heavy a work load to an engine, but Neodesha's engineers have reason for confidence in their equipment. The municipal light plant dates back to 1910 and it was 12 years later that the steam engines were replaced by a pair of 550 hp, two-cycle Nordberg air-injection diesels. These engines met the load requirements for another dozen years. In 1934, a larger Nordberg air-injection diesel, rated 880 hp at 257 rpm was installed. This engine, now designated No. 2, actually ran 97.8 per cent of the time for 12 long years, carrying a difficult, variable industrial load. A look at the engine hour meter on January 1, 1957, showed that this unit had logged 116,392 hours of service. It has never been necessary to remove a shim from main or crank bearings.

In 1946, Neodesha installed a 1620 hp, two-cycle solid injection Nordberg diesel. Two years later it was converted to a high-pressure Dualfuel engine and became the first prime mover in the plant to burn natural gas. Then, in 1952, the 1750 hp, supercharged Dualfuel unit was installed. With this engine in almost continuous service, Neodesha planned additional plant expansion that would provide for load development and assure reserve generating capacity. This southeast Kansas municipality has a population of 3800 and is both an industrial center and a shopping center for a broad belt of wheat, corn, alfalfa and cattle farmers. An alfalfa dehydration plant provides a heavy seasonal load which combines with air conditioning to make June, July and August the plant's peak months. A nearby Standard Oil refinery is not only a convenient source of fuel oil but an occasional power customer when boilers are down for maintenance. With the refinery load, the city's



plant has carried peaks as high as 2100 kw. On the whole, there has been some decline in industrial load and a compensatory rise in residential consumption, giving the plant a better balanced and more profitable load. Rather than build an extension, Neodesha removed the two original 550 hp engines to make room for the new unit. It is indicative of the progress in engine design that the new 3150 hp diesel fits nicely in the space occu-

pied by one of the 550 hp units, leaving space for still another big engine. The new V-type, 16 cylinder Nordberg Supairthermal supercharged Dualfuel engine develops its rated horsepower at 450 rpm and drives a 2812 kva, 2250 kw, 3 phase, 60 cycle, 4160/2400 volt generator. Complete accessory equipment serving the engine includes a full-flow lube strainer, cellulose cartridge lube bypass filter, an activated clay filter on the plant fuel sup-

TABLE I

Operating Record City of Neodesha, Kansas
Nordberg FSG-1316-HSC Supairthermal Duafuel Generating Unit

| Month | Hrs. Opr.* | Gas, MCF | F.O., Gals. | Kwhs Gen. | Lube Oil Cons., Gals. |
|--------------|--------------|---------------|---------------|------------------|-----------------------|
| Sept. '56 | 346 | 2,037 | 2,582 | 248,000 | 68 |
| Oct. | 675 | 4,609 | 4,378 | 427,000 | 71 |
| Nov. | 542½ | 3,724 | 3,314 | 343,000 | 84 |
| Dec. | 404 | 3,100 | 2,480 | 280,000 | 74 |
| Jan. '57 | 578½ | 1,413 | 34,207 | 686,000 | 270 |
| Feb. | 161½ | 1,047 | 1,583 | 108,000 | 120 |
| Mar. | 605½ | 1,860 | 3,868 | 443,000 | 120 |
| TOTAL | 3,313 | 20,790 | 52,412 | 2,535,000 | 807 |

*Includes straight oil operation during Winter months when gas was curtailed as well as dual-fuel gas operation. Above records average: 10,220 btu kwh total gas and oil. 12,931 bhp-hrs. per gallon lube oil, at 35.5% average load factor.

Example of fuel consumption rates: In January, engine operated 417 hours, of 578½ hours, on oil consuming 32,227 gallons of fuel oil (130,000 btu gal.) and generated 505,000 kwhs, averaging 15.6

kwhs/gal. on fuel oil operation, on an average load factor of 54%. In March, engine operated 605½ hours, all on gas, consuming above listed consumptions, averaging 15,898 bhp-hrs. per gallon of lubricating oil, 10.9 cu ft gas (920 btu cu ft, lhv), and 115 kwhs per gallon of pilot oil, on an average load factor of 32.5%. Engine peaking at 2100 to 2200 kw on gas from March 26 to March 31, 1957.

ply in addition to fuel filters on the engine, an oil-bath intake air filter, lube and jacket water heat exchangers with automatic thermostatic valves. Automatic controls switch the engine to straight oil operation if the gas supply fails and shut the engine down if pilot oil fails. A gauge board holds exhaust pyrometers, an alarm panel, and push-button controls for auxiliary equipment.

A new operating schedule for the plant will provide better load factors. The big No. 6 engine will run 24 hours a day through the summer months, probably all the way from May 1 to November 1. The other units will be added if the refinery calls for power. The winter loads will be carried by the 1750 hp No. 5 Nordberg with help from smaller units as necessary. The result is certain to be

even greater economy for an already profitable plant. The city's electric system is operated by Superintendent Powell and his staff, with policy supervision by Mayor Ross K. Lawrence; George M. Christy, who succeeded R. F. Riley as Commissioner of Streets and Public Utilities and Adley Lorbeer, Commissioner of Finance. The City Clerk of Neodesha is S. G. Hamilton. In previous issues of DIESEL PROGRESS the Neodesha municipal plant was first described in the April, 1942 issue and then again in the October, 1953 issue. In each case, additional Nordbergs were added at that time.

**Neodesha, Kansas, Equipment
Serving No. 6 Engine**

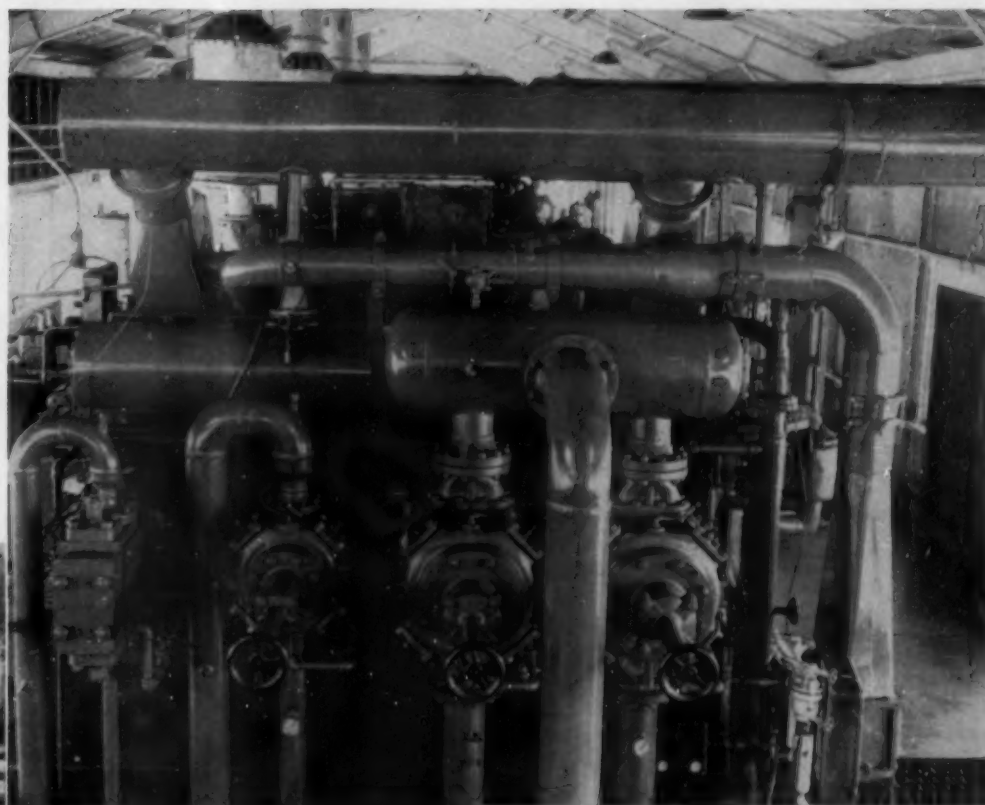
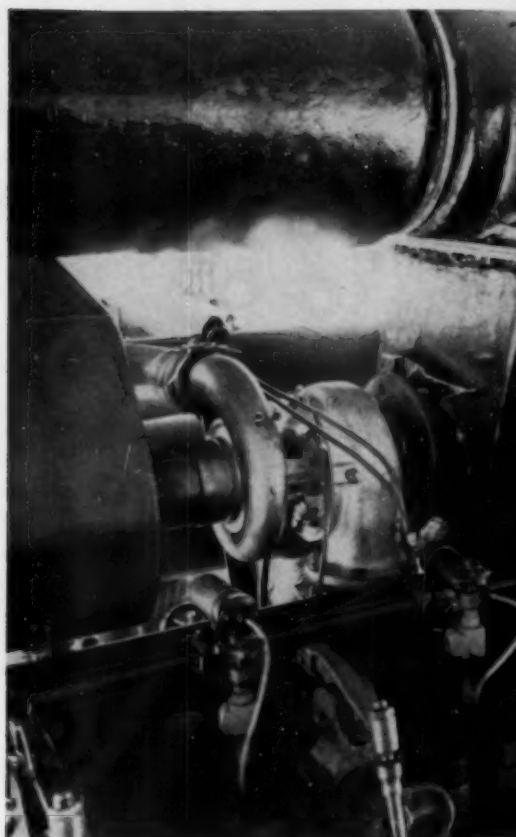
| | |
|-----------------------|--|
| Engine | 3150 bhp, FSG-1316-HSC, 16 cyl., V-type, Supair-thermal Duafuel engine. Nordberg |
| Alternator | General Electric |
| Turbocharger | DeLaval |
| Fuel oil | Standard Oil Co. (Ind.) |
| Plant fuel filter | Honan-Crane |
| Engine fuel filters | Nugent |
| Lube oil | Standard Oil Co. (Ind.) |
| Full flow lube filter | Purolator |
| Bypass lube filter | Hilliard |
| Oil cooler | Young |
| Auxiliary lube pump | Roper |
| Air filter | American Air Filter |
| Exhaust silencer | Maxim |
| Heat exchanger | Young |
| Thermostatic valves | Amot |
| Gas safety controls | Fulton Sylphon |
| Alarm panel | Viking Instruments |
| Exhaust pyrometers | Alnor |

The Neodesha, Kansas, municipal electric plant, where a succession of six Nordberg diesels have supplied all power requirements since 1922. Serving the city's newest engine are the American Cycloil air filter and the Maxim exhaust silencer seen in this view.



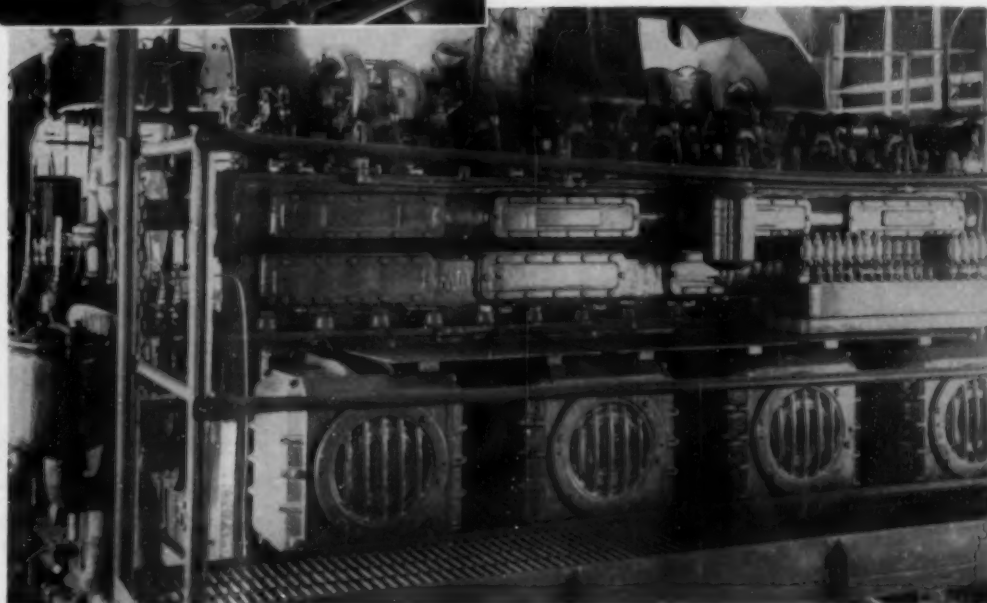
NEW TURBOCHARGER INSTALLATION IN NATURAL GAS ENGINE FIELD

By W. L. BODE



cycle, spark ignition engine, using natural gas as fuel. Its eight power cylinders have an 8-inch bore and 8-inch stroke. It is equipped with four compressor cylinders and four scavenging cylinders. The two E-100 turbochargers are mounted on the Clark engine exhaust in the conventional manner. The turbocharger compressors draw air from outside the building through adequate ducting. This compressed air from the compressor is directed to the engine intake manifold through an AiResearch intercooler. The intercooler reduces the temperature of the air and therefore reduces the thermal level of the engine. The scavenge cylinders are retained in the system to assist in starting and idling. The net result of the AiResearch multiple turbocharger installation is that denser air is delivered into the engine, enabling it to burn more fuel, therefore increasing its output.

TWO E-100 AiResearch Industrial Division turbochargers have increased the horsepower output of a Clark MA-8 natural gas engine driven compressor, and have thereby introduced multiple AiResearch turbocharger installations into the natural gas field, announces Robert Butler, Sales Manager. This new innovation of multi-turbocharging has opened up a wide market for AiResearch turbochargers. The natural gas engine compressor, operated by the Richfield Oil Corporation at an altitude of 1800 feet in New Cuyama, California is used to pump natural gas. The engine operates 24 hours a day. Without a turbocharger, it is rated at 300 hp at 600 rpm at sea level. However, after a series of tests, AiResearch engineers completed installation of two E-100 turbochargers. Result of their efforts was an efficient increase in horsepower output to a range of 330-350 hp under the existing altitude conditions. At one stage, it ran as high as 367 hp. The newly turbocharged unit is a two-



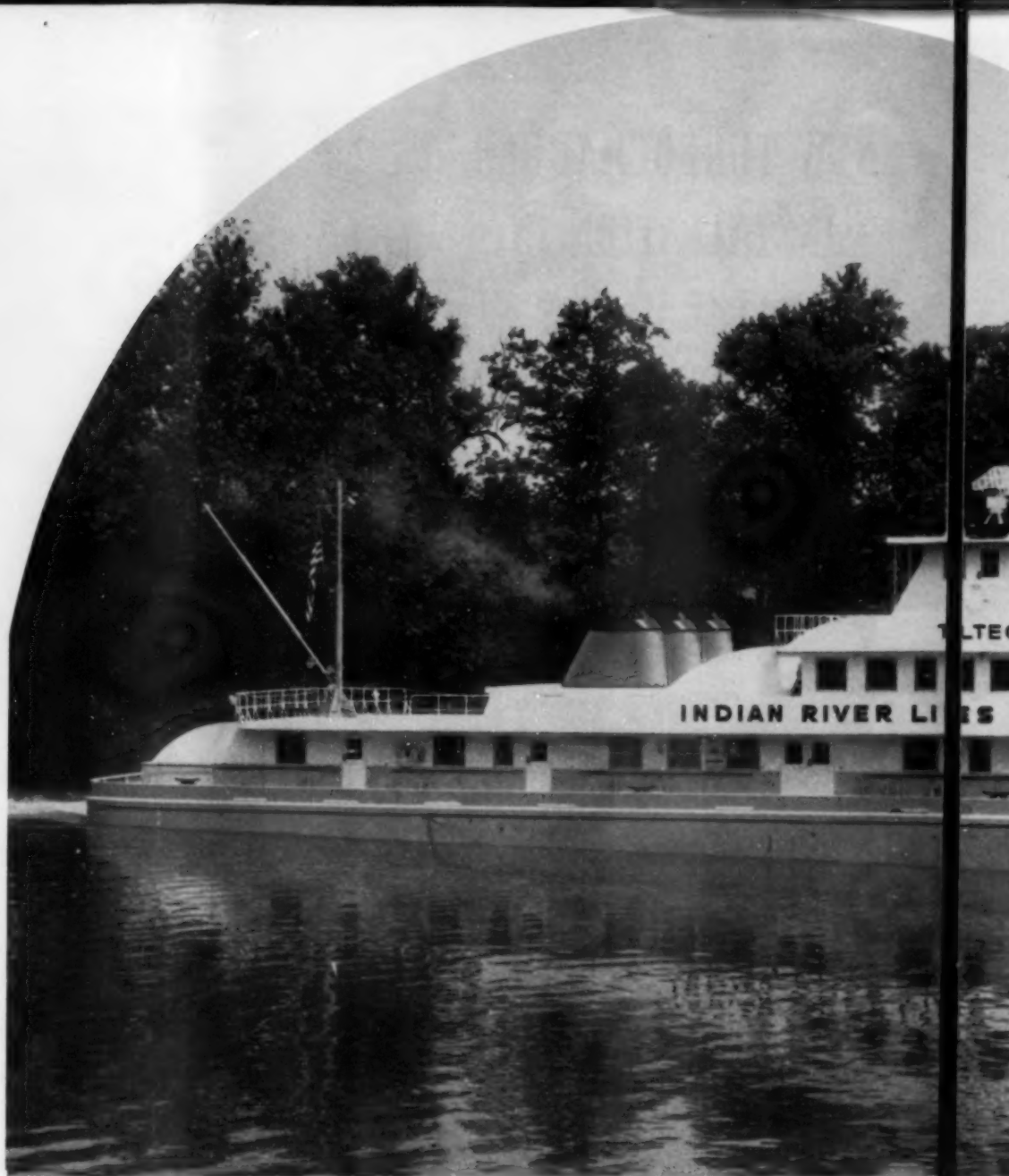
M/V TOLTEC

THE Atlantic Seaboard, the Great Lakes area, and the Far West have met in the Deep South to effect and build the big 3975-hp diesel-powered motor vessel *Toltec*. Required for their extensive river operations by the Indian River Lines, Inc., of Wilmington, Delaware, designed and engineered by A. M. Deering, able marine engineer of Chicago, powered with engines manufactured by the Enterprise Engine and Machinery Company, a subsidiary of General Metals Corporation, of San Francisco; and built by Nashville Bridge Company of Nashville, this boat has a coast-to-coast significance geographically.

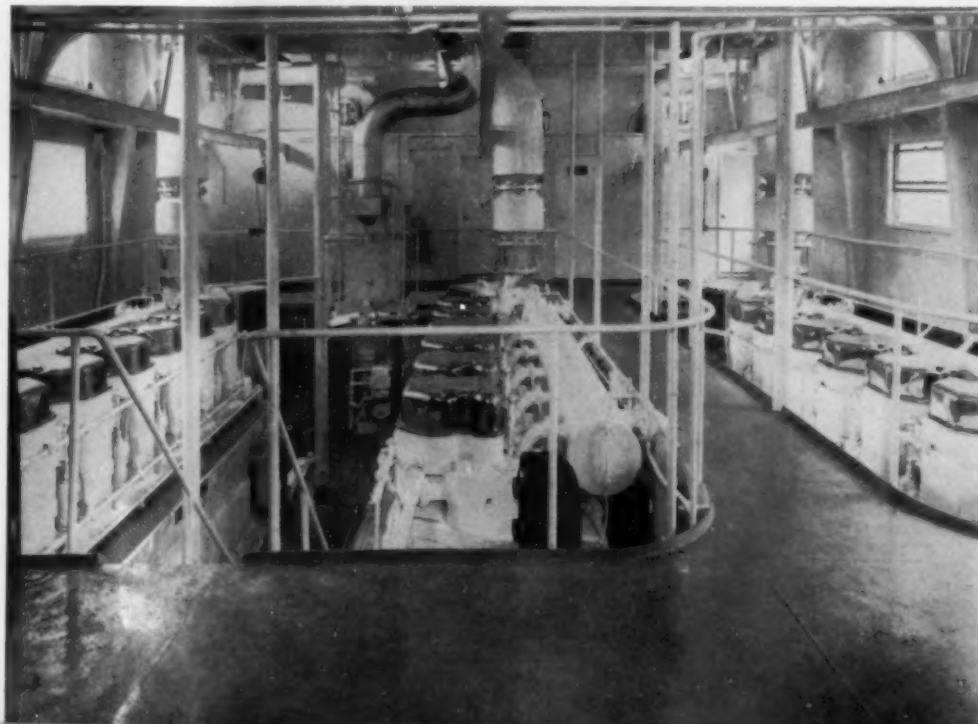
Its name is arresting and somewhat unexpected on the inland waters of our country, where most tow-boats bear familiar and colloquial names on their bridge rails. *Toltec*! Evidencing the interest of the owners and operators of Indian River Lines in the cultured Indian tribes of South and Central America and Mexico (they even call their company Indian River Lines), several of their vessels bear similarly intriguing names, such as *Aztec* and *Inca*. The name *Toltec* belonged to a people, perhaps a Maya tribe, who settled in Central Mexico about 752 A.D., and developed a kingdom there which lasted until about 1070, when their downfall drove them southward into Yucatan and other Central American sections. Whatever their history, the *Toltec* were considered the first bearers of arts and knowledge in aboriginal America. The most important of these prehistoric representatives on our continent spoke the Nahuatl language, which is still the mother tongue of over a half million Mexican Indians, although it became standardized to the dominant Aztec by Spanish influence. So, the name *Toltec* selected by her operators extends the interesting significance of this fine boat even beyond the geographical borders of our country, and it is hoped that this namesake of a once proud and excellent people will likewise distinguish herself.

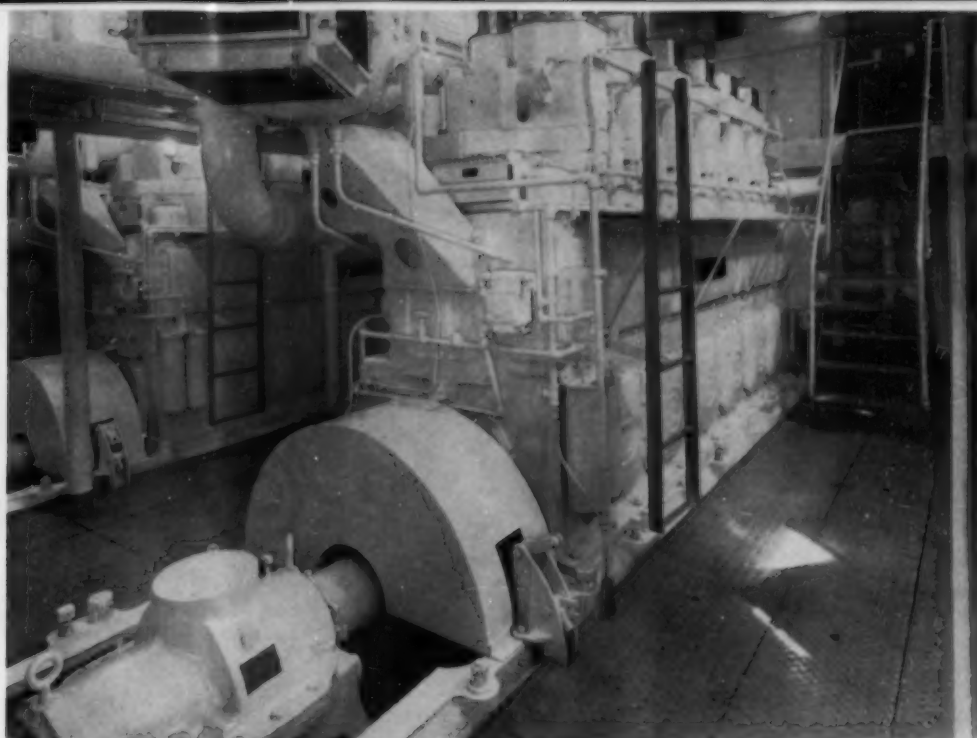
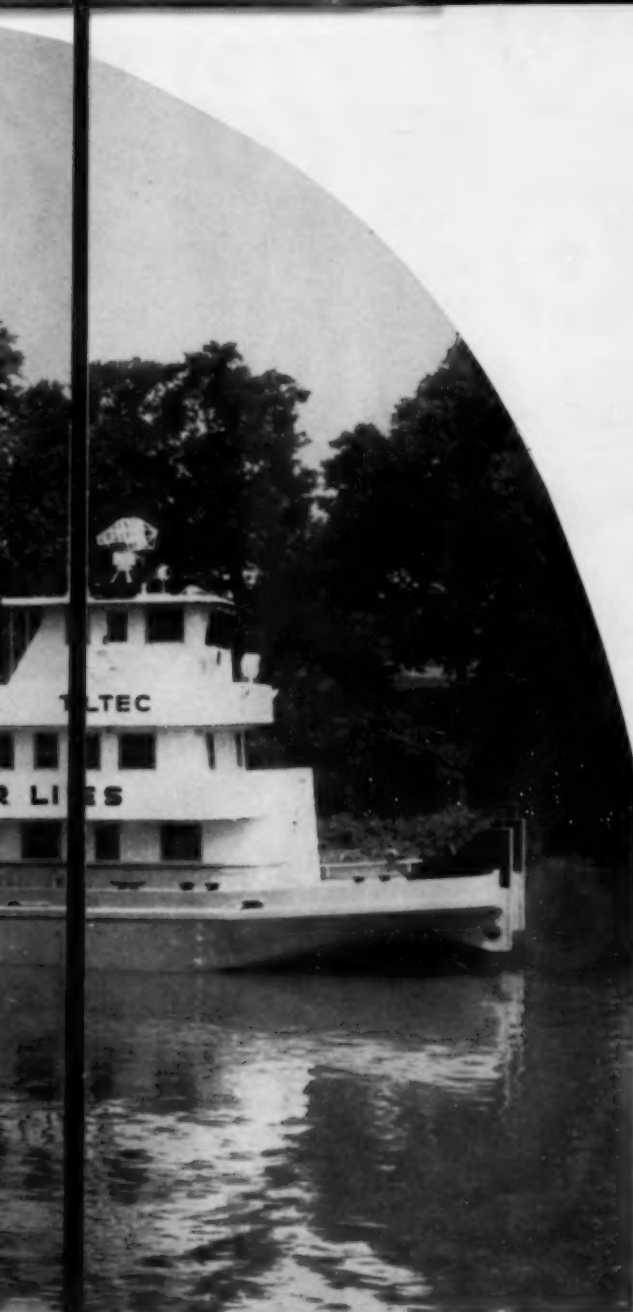
When Mr. Charles E. Fernald, President of Indian River Lines, Lea River Lines, and Chemical Barge Lines of Wilmington, Delaware, decided that he would add another vessel to his fleet which is engaged in moving liquid and dry cargos on the Mississippi River System and the Intracoastal Waterway, he called on a well-known and capable naval architect and marine engineer of Chicago, Augustus M. Deering, familiarly known as "Gus" by his friends, to work up a design along the lines he had in mind. Then, he turned to an old friend and respected builder of inland river equipment, Nashville Bridge Company, to bring this vessel off the drawing board and the building ways into the Cumberland River and then into the whole Mississippi River system.

The keel was laid on September 24, 1956. In March 1957, the big vessel left the ways, had her three big power plants lowered into her engine compartment by crane; and, on May 28, the *Toltec* went upstream in the Cumberland River for a trial run to test out her controls, rudders, maneuverability, performance in the most rigid workout the Company "test pilot", Captain H. B. Dyer could



Upper engine room of the *Toltec* showing the three Enterprise diesels which are Elliott turbocharged, fitted with Manzel cylinder lubricators, Air-Maze air filters, Winslow fuel filters and Briggs lube filters.





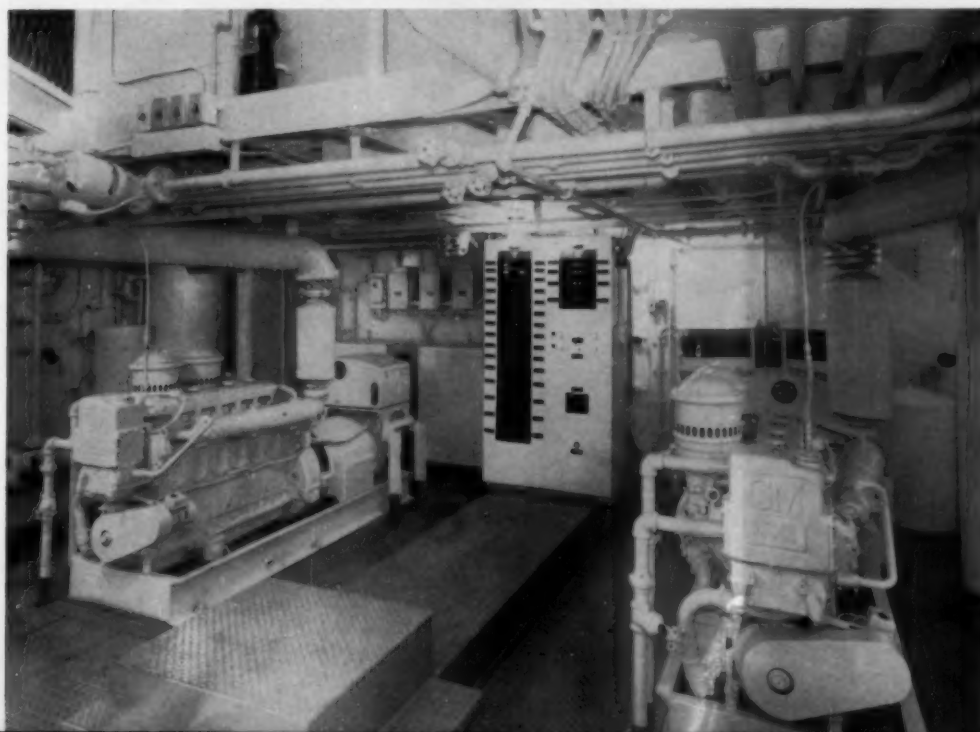
Lower engine room view of the *Toltec* showing two of the three Enterprise diesels with Manzel mechanical lubricators prominently in the foreground and Air-Maze air intake filters in top left corner.

give her. She behaved even better than expected, and the *Toltec* slipped quietly back into her berth at the Company dock, with the broom of a perfect "clean sweep" tied to her flagstaff. In river vernacular, the *Toltec* is called a triple screw, for she gets her power (equal to that of 3975 horses) from three Enterprise model DMZ-36, turbocharged, direct reversible marine engines rated at 1325 bhp each at 300 rpm. 3975 horses straining at their collars would take up an incalculable amount of space and would weigh approximately 6 million pounds, but these three engines developing that same amount of pulling power occupy little more space than three automobiles and weigh approximately 300,000 pounds.

For the information of builders and operators of river vessels, the engines on the *Toltec* are 6-cylinder, 16 in. bore x 20 in. stroke, vertical, in-line, single-acting, 4-stroke cycle, completely enclosed,

full pressure lubricated, solid injection type, turbo-charged power plants with full pilot house control. Each engine drives a Kahlenberg cast steel, four-blade propeller, 82 in. in diameter. This very modern boat, of 130 ft by 10 ft 6 in. moulded dimensions, has exceptional maneuverability, as evidenced by the performance in trials and under operating conditions; and this is a result of the four flanking rudders and three steering rudders by which her movements are controlled. The electric power on the *Toltec* is provided by two 100 kw, 220 volt, 3-phase, 60-cycle ac diesel-driven generators. The *Toltec* has spacious, comfortable, and convenient quarters for officers and crew, as well as all modern devices and equipment that are regarded as standard on present-day efficient river vessels. One innovation by the owners is the natural birch trim in the galley, which is a change from the traditional all white galley interior. The galley itself is unusually large and well-equipped to insure the best in service for the men aboard.

The roomy auxiliary engine room with a pair of 6-cylinder Detroit Diesels direct-connected to 100 kw Delco generators. In the background is a Sharples lube oil purifier and the silencing is capably handled by Maxims on all five engines.



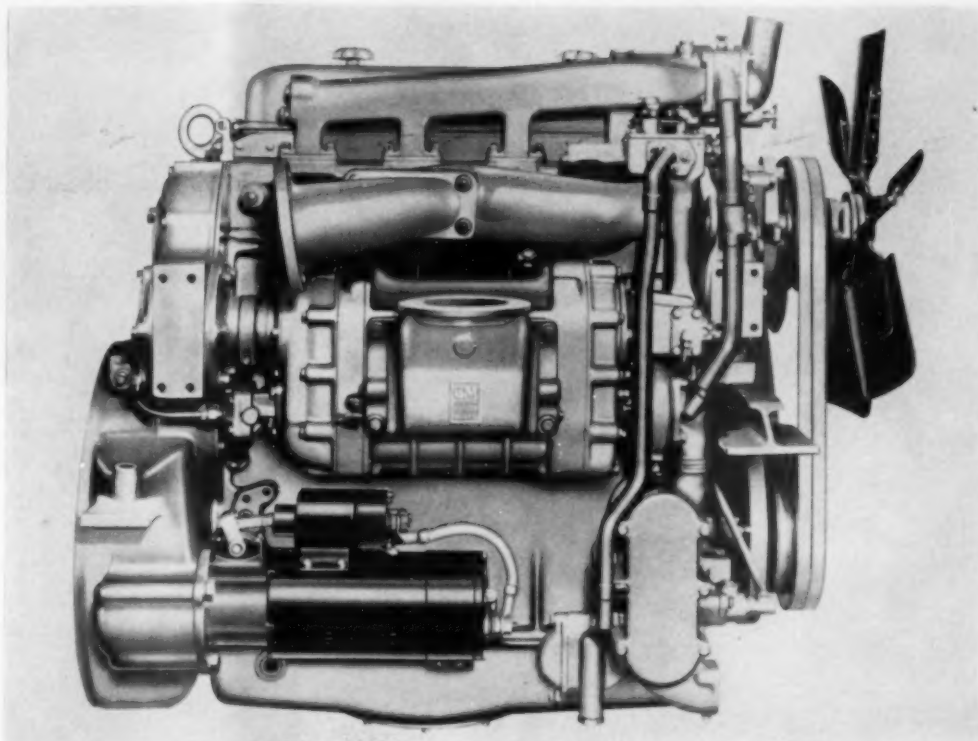
In early June, the *Toltec* joined her sister ships of the Indian River Lines fleet and will be seen on the waterways and anywhere from Pittsburgh to New Orleans, busy at the job of transporting chemicals, coal, petroleum products, and other commodities. River men who watch her as she passes, who tie up alongside her, will talk only of her competitive showing with other vessels on the rivers. Some may wonder where she got the name *Toltec*. To those who have known her since conception and development, she has, as has already been said at the beginning, a coast-to-coast and Great Lakes-to-Gulf significance of which, perhaps, none of her competitors may boast. Created out of her operator's knowledge of the necessary ingredients for a good, sound boat, planned and designed by a naval architect who knows his business, and built by a Company whose reputation is for excellent quality and workmanship, the M/V *Toltec* has a tradition to uphold; and there is little doubt that she and her equivalent of 3975 horses will navigate the rivers with a performance to justify that tradition.

DETROIT DIESEL'S NEW TRUCK AND BUS ENGINES

By W. L. BODE

A new line of diesel engines, developed for trucks and buses, has been announced by the Detroit Diesel Engine Division, General Motors. The new series, 71-E and 71-T engines, are available to truck and bus manufacturers for installation as original equipment in four and six cylinder models. Robert E. Hunter, general sales manager, stated that "Our intention in designing these new engines was to produce heavy-duty diesels specifically for the rapidly growing transportation industry; to make them generally available to all truck and coach manufacturers and to afford the most economical operation and maintenance the industry has ever had." The added economy of the new engines is derived from improved combustion and freer engine breathing. The result is an engine that has much lower fuel costs per mile, requires less maintenance, and has substantially longer life. The engines will power trucks and buses ranging from 26,000 pounds gross vehicle weight to 60,000 pounds gross vehicle weight and up. Several of the major engineering improvements were outlined by Mr. Hunter. The "E" series has four exhaust valves per cylinder, instead of the conventional two, to insure the expelling of all exhaust gases. Its fuel injectors have a newly designed spray tip which more completely atomizes the fuel for more efficient combustion and to reduce fuel consumption. An increase of 38 per cent in the cylinder liners' air inlet area will result in cooler piston operation and longer engine life. Its "fire ring," a newly designed top compression ring, will also add to the piston life and to engine power. A new high-capacity, low-speed blower, packing more fresh air into the cylinder, results

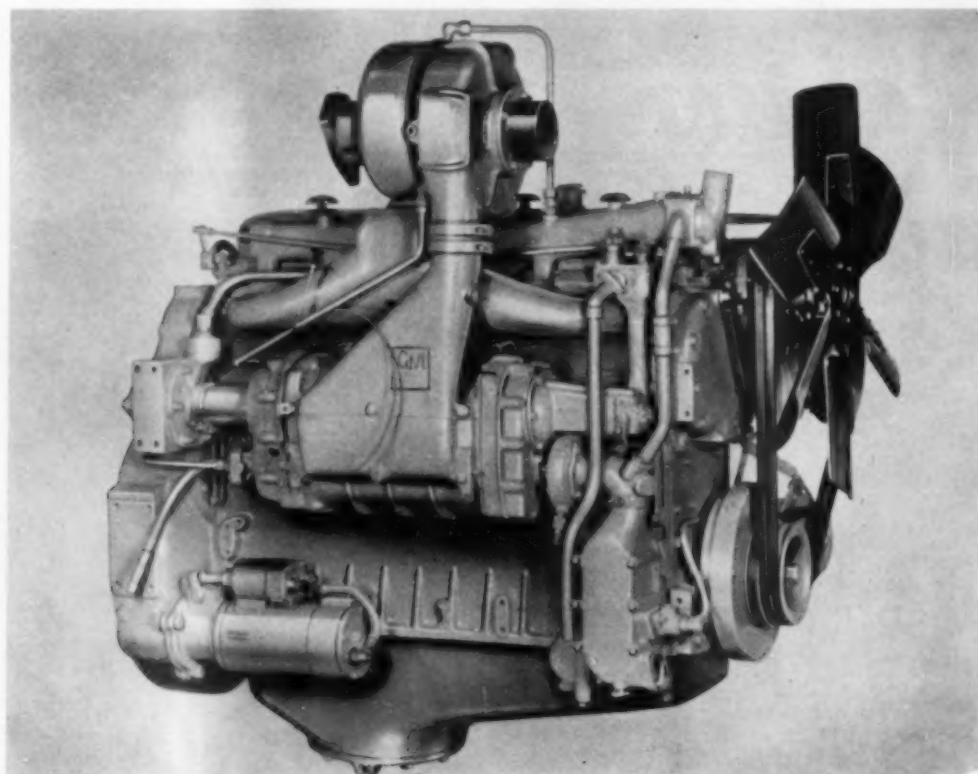
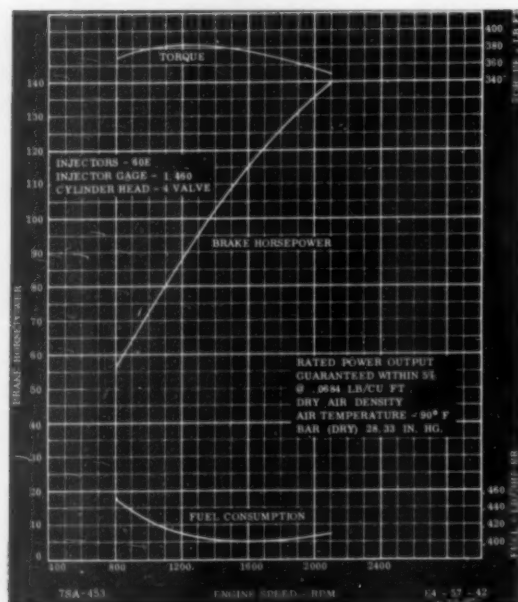
in greater engine efficiency. "These improvements," Mr. Hunter declared, "will give better highway performance and measurable better economy than the present 200,000 to 250,000 miles between overhauls." The four cylinder 71-E has a basic brake horsepower rating of 140-hp at 2100 rpm; the six-cylinder is rated at 210-hp at 2100 rpm. The engines are rated at 1,500 feet elevation,



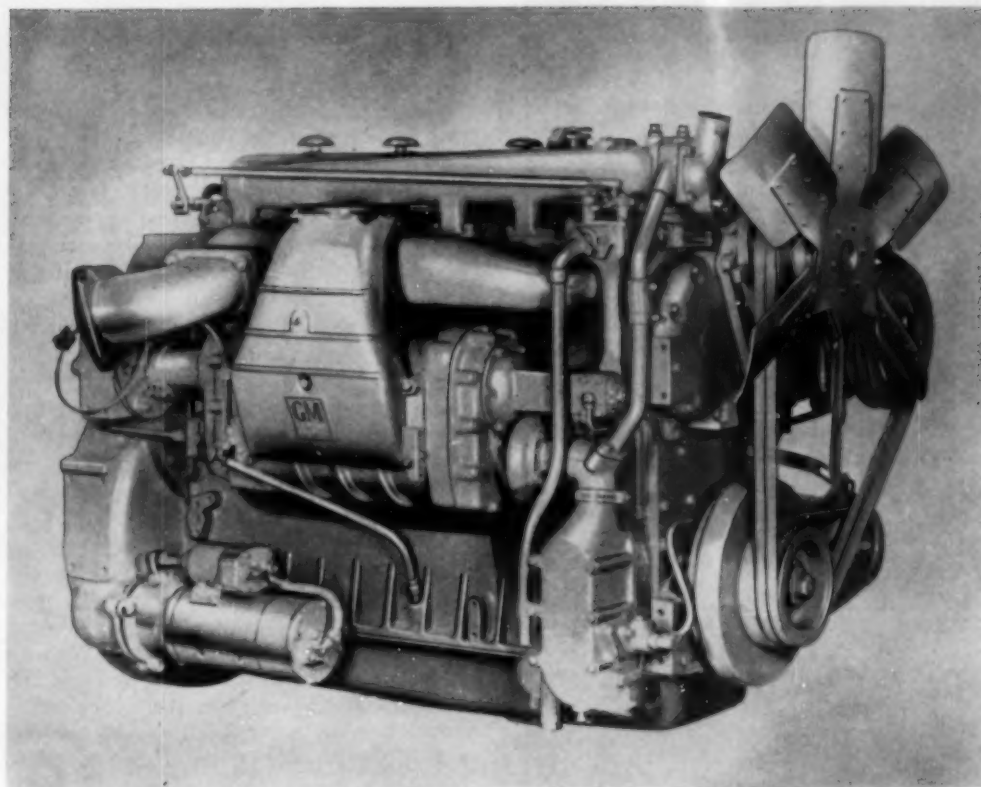
General Motors Detroit Diesel 4-71E engine for truck and bus manufacturers. This four cylinder, two-cycle engine features five new developments for greater economy and power.

Trucks testing this engine in the GM Detroit Diesel six cylinder 71T model have increased fuel mileage by as much as 15 per cent. Note Elliott turbocharger and Delco-Remy electric starter.

Model 4-71E truck and bus engines—
basic engine performance.



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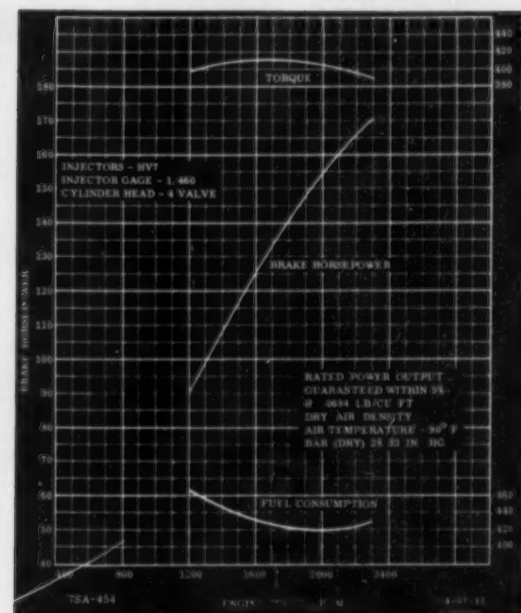
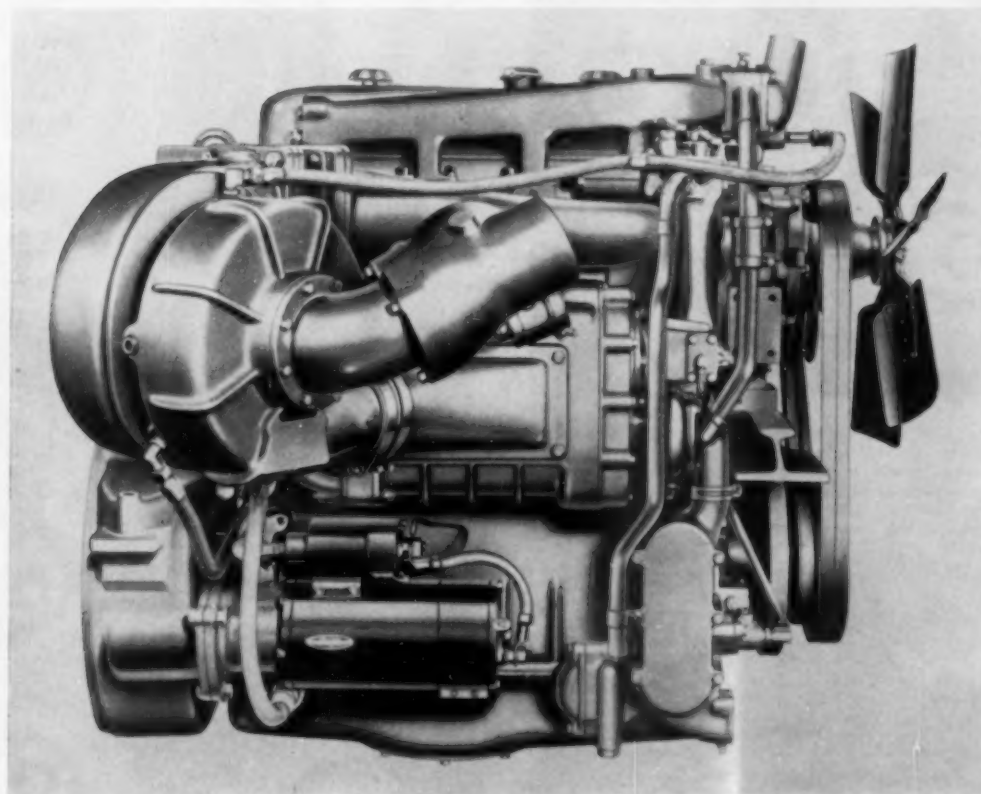


Featuring five new improvements, GM Detroit Diesel six cylinder 71E engine. This engine is rated at 210 hp at 2100 rpm. Available to all truck and bus manufacturers.

at 90 degrees F., a purposely conservative rating method to allow truck manufacturers to choose transmissions, differentials, and tire sizes for required on-the-road performance without de-rating. The 71-T series includes a turbo-charger operated by the engine's exhaust gases, which increases net

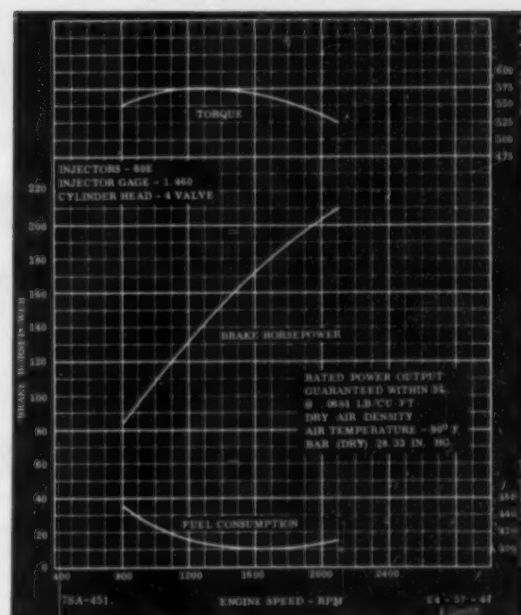
horsepower without additional fuel consumption. Trucks testing this engine in the six cylinder model have increased fuel mileage by as much as 15 per cent. The four cylinder 71-T has a rated horsepower of 171 at 2300 rpm, the six cylinder is rated 236 at 2100 rpm.

The GM Detroit Diesel four cylinder 71T model includes an Elliott turbocharger operated by the engine's exhaust gases. This increases the net horsepower without additional fuel consumption.

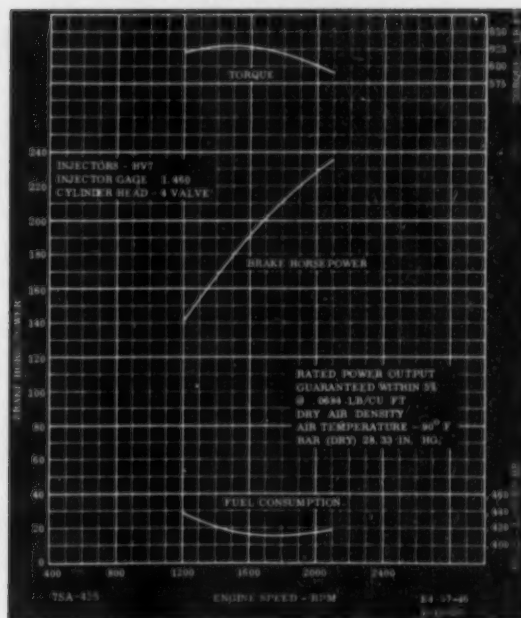


Model 4-71T.

Model 6-71E.



Model 6-71T.

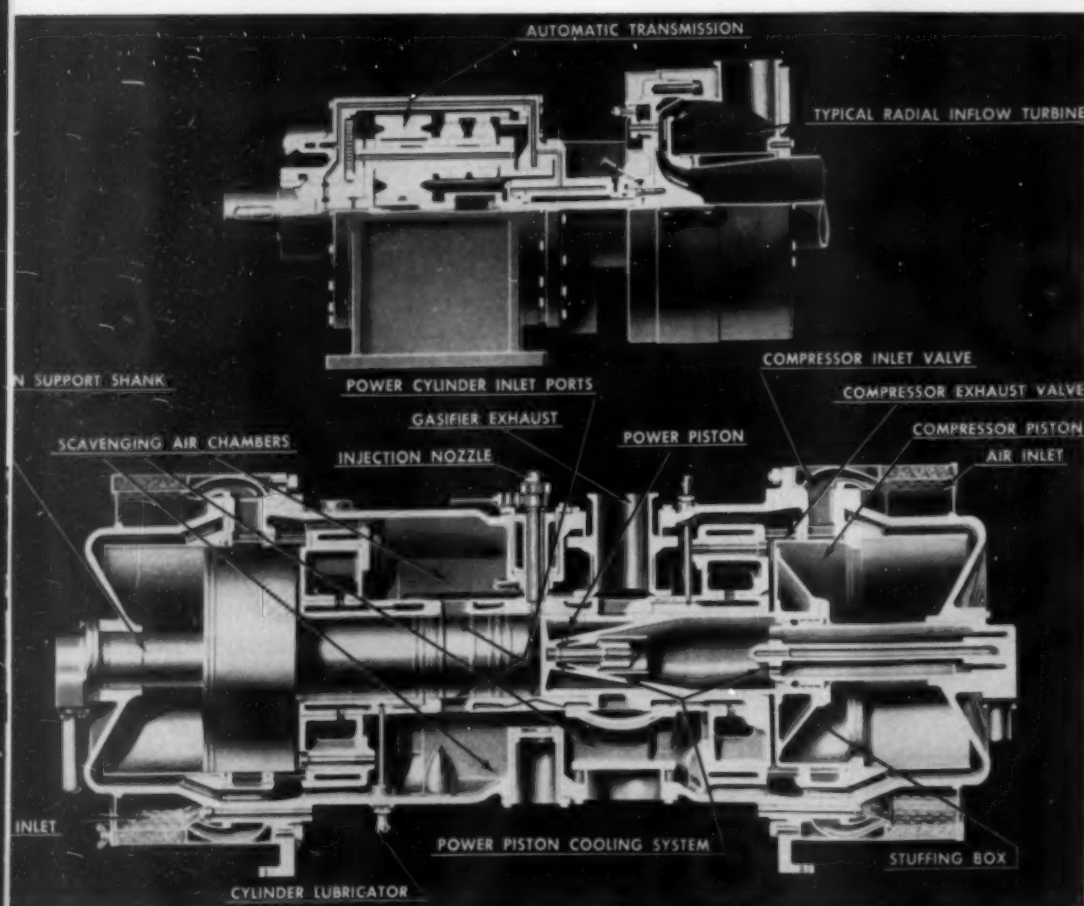


NEW TURBOCHARGED FREE-PISTON ENGINE

A new engine design, showing promise of being one of the most important breakthroughs in engine research, has opened the door to a new concept in the science of internal combustion. An advanced design of the free piston engine, the new power source appears to have a potential for almost every application. The free piston engine produces pneumatic power, in contrast with the crankshaft engine which produces mechanical shaft power. The pistons are free to bounce in their cylinders. They are restricted by the cylinders, but not by the linkage through connecting rods for a crankshaft as are the pistons of a crankshaft engine. The engine is possibly one of the most efficient users of fuel ever developed, and adaptable to burning a wide range of fuels. The most promising immediate uses for this engine are for stationary and mobile power plants, railroad locomotives, marine power plants, farm equipment, large tractor-trailer power plants, construction

ifier—up to 1,000 shaft horsepower when gasifiers are used in multiples. The range is available through the use of two types of free piston engines developed by Hamilton Division of Baldwin-Lima-Hamilton Corporation. Both engines are products of a continuing program of research and development that led first to a single-stage design—the Hamilton model DL—then to an advanced two-stage, turbocharged design—the Hamilton FP-165. The DL uses a single stage of compression and a patented movable compressor head to produce an output of 500 shaft horsepower. DL units can be combined in multiples with one turbine to reach a peak of several thousand shaft horsepower, when turbocharged. The new design FP-165 is a two-stage-compression unit which produces 250 shaft horsepower with turbocharging; 125 shaft horsepower without turbocharging. Analyses show that the FP-165 combines the excellent power-to-weight ratio and torque characteristics of an open-cycle

can be stacked, or combined, and connected to the same turbine, make the free piston engine ideal for marine use. Gasifiers can be mass-produced in standard sizes and horsepower ratings. By combining outputs of several gasifiers and feeding them into a common turbine inlet, individual units can be cut in to increase power, or cut off for economy during times of low power requirements. A gasifier can be serviced or overhauled while the turbine is running—by cutting it off from the turbine inlet line. This is possible even with the turbine producing full power if the gasifier's output is replaced with that of a permanently connected standby. Because of their small size and light weight, the units can be handled easily without the use of heavy cranes and other bulky tools. Thus maintenance and replacement requires minimum labor and equipment. The model DL unit has been built and tested over the past two years. It can be produced in quantity for a wide range of applications at any time. The FP-165 has been fully designed. Hamilton Division states that only production development and engineering are required to ready it for actual manufacture. Advanced performance of the Hamilton FP-165 hinges on its second stage of compression. All other free piston engines, and Hamilton's own previous designs, have been single-stage-compression designs. The second stage, by using the energy from the outward piston stroke, affords a balance of energies, and permits a rise in output power without excessive stress and heat on the compressor discharge valves. Because of the inherent bal-

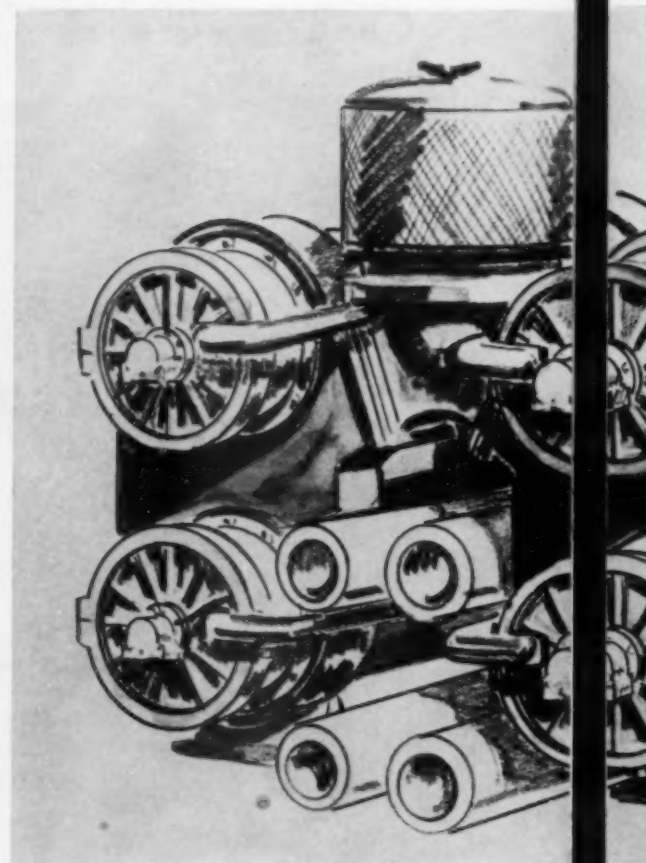


Two-stage engine, the FP-165, shown in cutaway section illustrates internal construction. Pistons travel in horizontal direction, are propelled outward by explosion of fuel injected into center combustion chamber. The pistons travel against bounce space air pressure. When the bounce space pressure exceeds the pressure exerted by the pistons, they reverse and move back toward center. Upper drawing shows partial cutaway of turbine and transmission which uses the hot gas pneumatic power from free piston gasifier to produce mechanical shaft power.

equipment and other off-the-highway power-driven vehicles. An effective use of the new engine can be made in the marine field. The engine is adaptable for use as an inboard power plant for almost any size craft below the level of large cargo vessels. Power output of the prototype design ranges from 125 shaft horsepower—available from a single gas-

gas turbine (previously the best engine in these two respects) with economy and efficiency of a diesel.

The free piston gas turbine plant can be made directly reversible and will provide reverse power up to 65 percent of its forward power rating. This feature plus the fact that standardized gasifier units

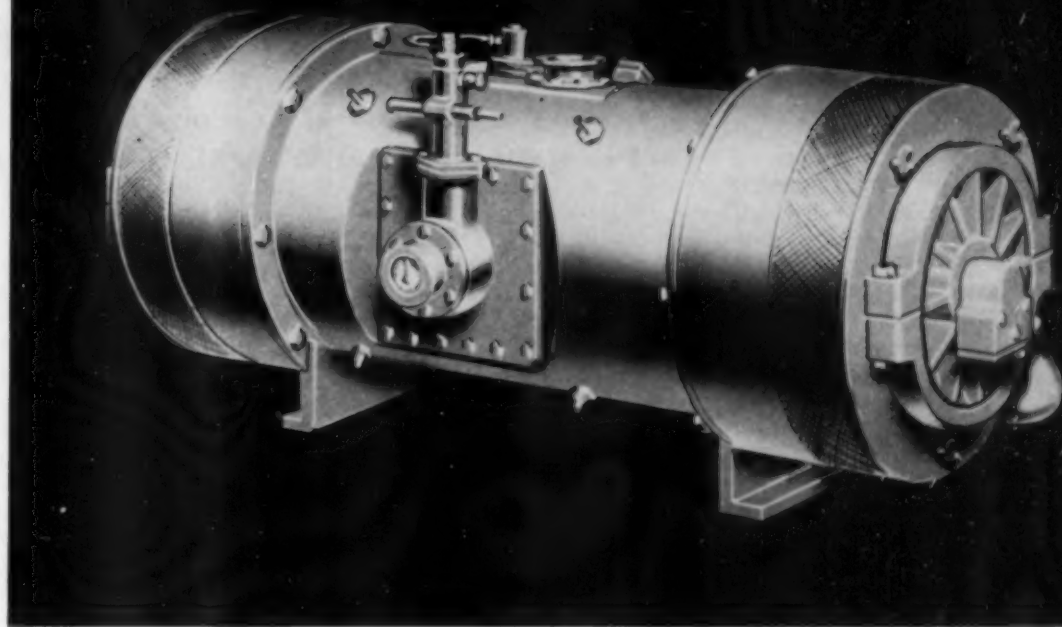
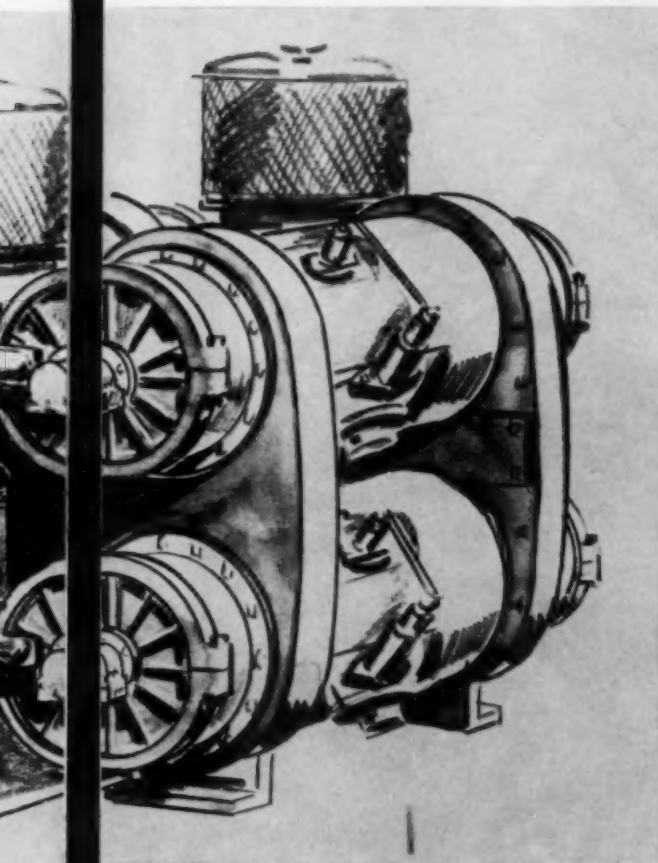


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ance, the units are virtually vibrationless in operation and need a minimum of foundation structure.

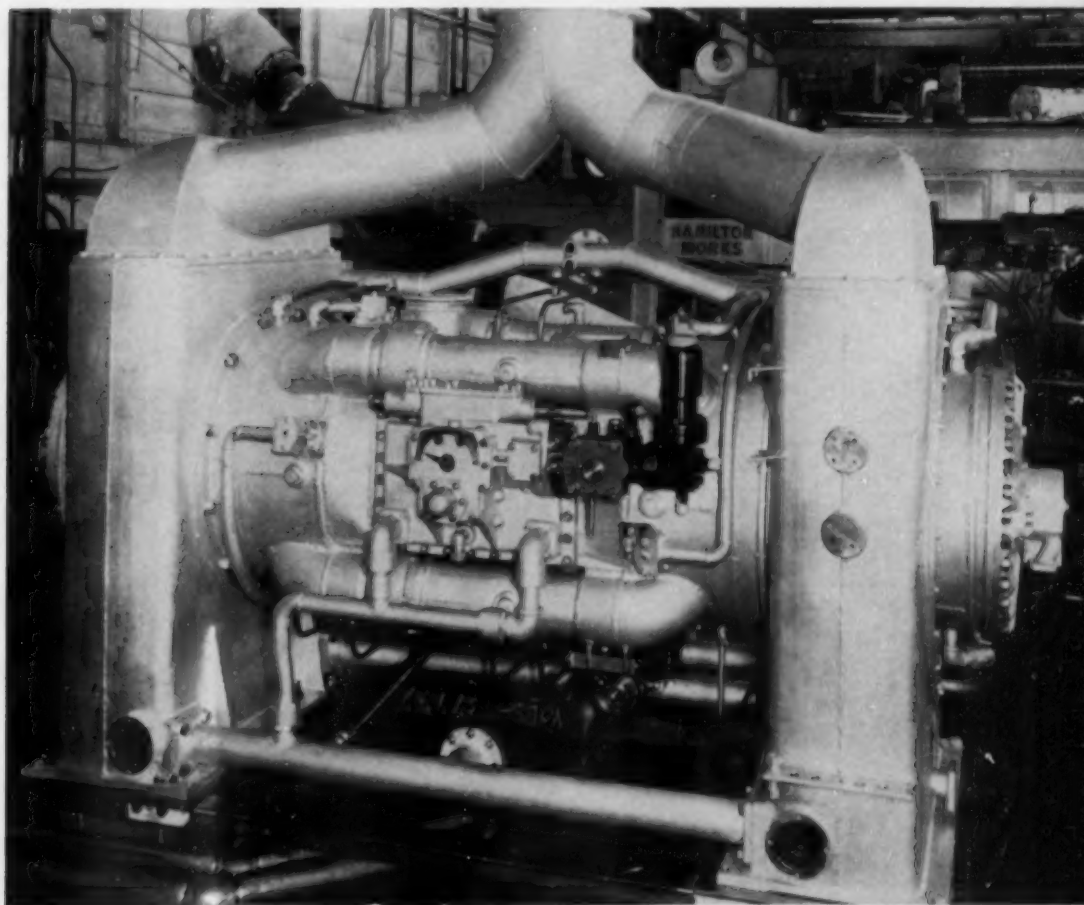
The free piston gasifier produces pneumatic power, in contrast to the crankshaft engine which delivers mechanical shaft power. In the crankshaft engine, power from fuel combustion is transmitted mechanically through pistons and connecting rods to the crankshaft. The pistons of a free piston unit have no mechanical linkage—they are essentially free to bounce back and forth in their horizontal cylinders. The gasifier power output is a hot compressed gas. Where such power containing heat is desirable or permissible, the free piston gasifier unit is tremendously versatile, flexible and economical. The pneumatic power can be converted easily into shaft power through a turbine to provide easily controlled variable speed, high-starting torque and direct reversibility of shaft rotation. From the results obtained with free piston engines, Hamilton Division of B-L-H believes that use of free piston machinery soon will be widespread. They state that large expenditures on further research and development for facilities to produce large quantities of the machines are warranted.

Flexibility, for adjustable power output, is achieved through standardization of free piston gasifiers. This configuration, showing quadruple-stacked FP-165 gasifiers in artist's concept, provides an output of 1000 shaft horsepower. The grouping is only one of at least a dozen ways in which gasifiers may be combined. These units feed their hot compressed gas output from four output pipes into the same inlet pipe to the turbine (not shown in drawing). Units may be cut off the line for economy, or for service or overhauling. A compact producer of 1000 horsepower, this unit is 4½ feet long, 3½ feet high and five feet wide.



Free piston gasifier, two-stage model FP-165, shown in artist's view. The gasifier hot gas output can power a turbine to produce shaft power, or its output may be used directly for such applications as compressors, pressure-feeding combustion chambers and impulse or hydro-jet propulsion of boats. The combination of a free piston gasifier and turbine provides high starting torque, controlled variable speed and direct reversibility without bulky transmissions and gearing.

On test, the Hamilton model DL single-stage gasifier—predecessor to the new two-stage design FP-165—produces 500 shaft horsepower. Two of these DL gasifiers have been on test at Hamilton Division since 1955. The engine is 9½ feet long, five feet high and five feet wide.



TRUCK LINE LINKS NORTH AND SOUTH

**Fleet of 250 Diesel Tractors Doing 6½ Miles
Per Gallon of Fuel With Maximum Availability.**

By ARNOLD B. NEWELL

THIS year marks the 25th anniversary of The Mason and Dixon Lines, with headquarters in Kingsport, Tennessee, who are operators of 1250 pieces of rolling equipment, travelling over 6,000 miles of franchised routes. Of these, 250 pieces are diesel tractors for open highway work. The diesel equipment is used strictly for over the road operation. The other tractors in the fleet are gasoline-engine powered White 300 cab-over units confined to operation within the cities. The Mason and Dixon Lines has a continuous fleet replacement program, of which the purchase of 250 diesel units is a part. Twenty-five of these tractors are Macks powered by Thermodyne diesels of 170 hp with 10 speed Unishift transmissions with emergency facilities and 225 are White 9000 series equipped with JT6 175 hp Cummins turbo-charged 20° Tilt diesels equipped with Fuller Roadranger R46S 8-speed transmissions. The Whites are equipped with Donaldson air filters and the Macks have Donaldson wet-type oil bath filters.

A companion to this efficient road fleet is the up-to-date materials handling facilities in The Mason and Dixon terminals. When a unit pulls into one of the terminal docks, freight is transferred to a truck which circulates on a continuous dragline system. This freight stays on the dragline until it's ready to move outbound. Working hand in hand with the dragline system is a new radio dispatch operation which enables ter-

minals to stay constantly in contact with all equipment operating on the road in their area. The Mason & Dixon Lines machines and equipment are tremendously important for efficient operation, but equally important are the men and women who make up The Mason and Dixon team with courtesy and thoroughness under the leadership of E. Ward King, Chairman of the Board.

Commenting on the diesel performance, Director of Maintenance, W. F. Eaton, states: "We are getting 6.50 miles per gallon on diesel equipment compared to 4.0 on gasoline equipment which is a large savings in our operation. The availability of the diesel tractor far exceeds the gasoline in that it does not have to be tuned up very often. Many of the little items that gave so much trouble on gasoline equipment are eliminated on diesel. We replaced 276 gasoline units with 250 diesel units and have done a better job, which proves the availability angle. We have found that the diesel engine is actually easier to work on and far easier to shoot trouble on. All of our units clear through Kingsport, so all servicing and preventive maintenance is performed in the main shop. We change oil and all filters every 6,000 miles. Wheels are packed every 30,000 miles and differential and transmission grease changed at the same interval. The chassis is greased and various checks are performed every 3,000 miles. Valves and injectors are adjusted every 12,000 miles, if

needed. Injectors are pulled and cleaned every 48,000 miles, if needed. We have complete test equipment and nothing is done to the engine unless it shows up on the test equipment as needing attention. All units checking into Kingsport are checked through the shop safety check lane and both tractor and trailer get various items inspected. Tires are gaged, matched and pulled for capping. Trailers are serviced every 15 days which includes jacking up the axles and checking for loose wheel, burst drum, worn lining and setting brakes. Trailer wheels are packed each year. We expect to frame overhaul between 125,000 and 150,000 miles which will include rebuilding the head, replacing liners, pistons and rings; if needed, inspecting bearings, crankshaft and camshaft and rebuilding generator, starter, water pump and fuel pump. We expect to pull engine and major overhaul at 250,000 miles."

The maintenance garage at Kingsport is equipped with every modern facility not only for routine maintenance but also for general overhaul and rebuilding of the engines and transmissions which, like the diesels are turning in a remarkable performance record. At 140,000 miles the transmissions were still performing very well. In general, the garage is well organized and clean. It has ample room for all of the routine work. Overhead reels carry lines of hose for greasing, oiling, tire inspection, etc.

Two of the White 9000 tractors powered by Cummins JT 175 hp turbocharged diesels equipped with a Fuller Roadranger 8-speed transmission and a Donaldson air filter.



The company history is as interesting as the current operation. Successful growth of the company can be credited to the far-sighted vision of its Chairman of the Board, E. Ward King. The Mason and Dixon Lines was first organized as a partnership between three individuals. With very little cash on hand, each partner purchased a tractor and trailer largely on credit. Loading, driving and servicing them, freight was delivered and new freight solicited before the return trip. Most of the financial transactions were handled out of the hip pocket. These were the "wild cat days" in the trucking industry since there were no federal regulations at that time and it was largely a matter of finding loads, quoting a price and traveling by whatever route desired to final destination. The first office of the company was located in Mr. King's home. He was loader and mechanic for the operation while the other two partners drove their trucks and his brother, S. T. King, drove his unit.

The original partners were very much interested in securing an outstanding, yet original trademark. For a time they had thought of something similar to that used by Greyhound Bus Lines. One evening King told his mother of their problem and she said, "Well, you are traveling between the North and South and you cross the Mason and Dixon Line, why not call it the Mason and Dixon

Lines and have General Lee and General Grant shaking hands as a symbol". Thus, this fine lady created a slogan, a name, and a trademark—The Mason and Dixon Lines—now, joining the North and South. In 1934, the Mason and Dixon Lines was incorporated with a capitalization of \$10,000. When Motor Carrier Act was passed in 1935 the company had expanded its facilities with principal operations from Atlanta to New York. Most of the territory now served was being served at the time this Act was passed. The principal rights were obtained under the "grandfather clause" of the Act and for some two or three years the company was involved in hearings and the preparation of evidence to prove prior operation in order to support its application for "grandfather" franchises. Throughout the pre-war years the Mason and Dixon lines acquired the rights of several companies which gave it intrastate rights in Tennessee and Georgia. In 1939 the company had grown to the operation of some 150 units and in that year Mr. King purchased the stock interests of the other partners and since that date has been the majority stockholder of the corporation.

During the war years the company was operated in spite of the shortage of tires, gasoline, essential parts and new equipment and actually maintained its fleet out of a junkyard of wrecked and worn-out vehicles which had been accumulated over

the previous ten years. At the close of the war, The Mason and Dixon Lines, like most trucking companies, was faced with the problem of replacing the completely worn-out fleet of equipment and an immediate program was launched into a million-and-one-half dollar fleet replacement program. During 1956 a total of 25,386,289 miles were travelled in transporting 1,020,736,000 pounds of freight with a resulting \$15,127,074 in revenue. To help in the delivery of this amount of freight a leased telephone line to 18 major terminals was utilized. This company was one of the first major trucking companies to install and use successfully a leased line for effective central dispatch control. In this operation a central dispatcher in Kingsport routes and dispatches equipment throughout the system. The system is also used for the tracing of lost and damaged freight.

In 1949 a terminal modernization program was begun with the completion of a new metropolitan New York terminal and since that time, eleven more have been completed. The Kingsport facilities were enlarged in 1954 with a second story to the office building and an addition to the warehouse. Like many of the other major freight lines operating on the highways of the nation, The Mason and Dixon Lines uses diesel driven vehicles because this is the most economical and all-around satisfactory form of power to be had.

Aerial view of the Kingsport terminal showing the newly enlarged head office, excellent parking facilities and freight shed in which a dragline system of freight transfer is employed. The modern maintenance garage is shown directly back of the freight shed.



"MR. GUS II"

In The July 1955 Issue of DIESEL PROGRESS We Brought You News of Mr. Gus, Which Was Then One of The Largest Off-Shore Platforms Built to That Date. Now We Bring You Details of Mr. Gus II, Both Built to The Order of C. G. Glasscock Drilling Company.

THE most powerful diesel electric plant designed to provide power for an off-shore drilling rig (6,000 maximum horsepower) has been assembled in Houston by Stewart & Stevenson Services, Inc. and placed on a giant mobile platform designed for ultra deep water operations. In terms of horsepower or kilowatt output, the RIGELECTRIC power packages which will supply power for the entire drilling operation are sufficient to satisfy the normal domestic requirements of an average city of over 30,000 people. The Stewart & Stevenson RIGELECTRIC units are on the *Mr. Gus II*, a mobile platform built in Beaumont, Texas by the Bethlehem Shipyard for the C. G. Glasscock Drilling Company of Corpus Christi, Texas. This new mobile platform, the *Mr. Gus II*, and its modern, powerful RIGELECTRIC power plant eclipse the first C. G. Glasscock mobile platform which has been operating for almost two years and has set quite a record in deep water drilling. The original *Mr. Gus* has drilled nine wells, one in approximately 87 ft of water and almost 70 miles offshore. The new greater *Mr. Gus II* will be capable of probing for oil and gas in water up to 150 feet. To accomplish this feat, the management of C. G. Glasscock Drilling

Company called again on dependable diesel equipment and the know how of Stewart & Stevenson Services. The result is a power plant that shades that of the original *Mr. Gus* by almost 2000 horsepower and yet is extremely compact and conserves considerable space over the original power plant of the *Mr. Gus*. Power output on *Mr. Gus II* is 6000 horsepower maximum for the drilling equipment with additional power for auxiliaries exceeding 1500 horsepower. The primary power for *Mr. Gus II* consists of five Stewart & Stevenson model S24-1000 RIGELECTRIC power packages each of which is composed of two 600 horsepower dc generators and four model 6-110 Detroit Diesel engines. The arrangement is such that on each of the five power packages, all four of the model 6-110 engines may supply power to both generators simultaneously, or if desired, all four or any part of the four engines can be called upon to supply full power through either of the two generators.

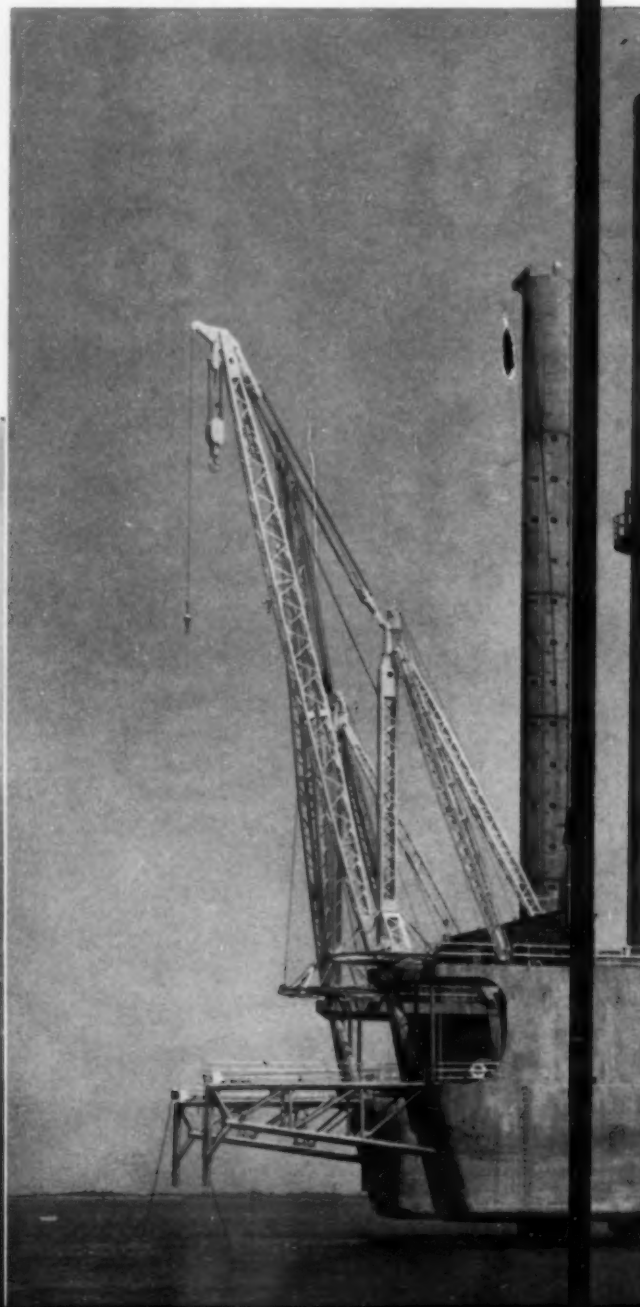
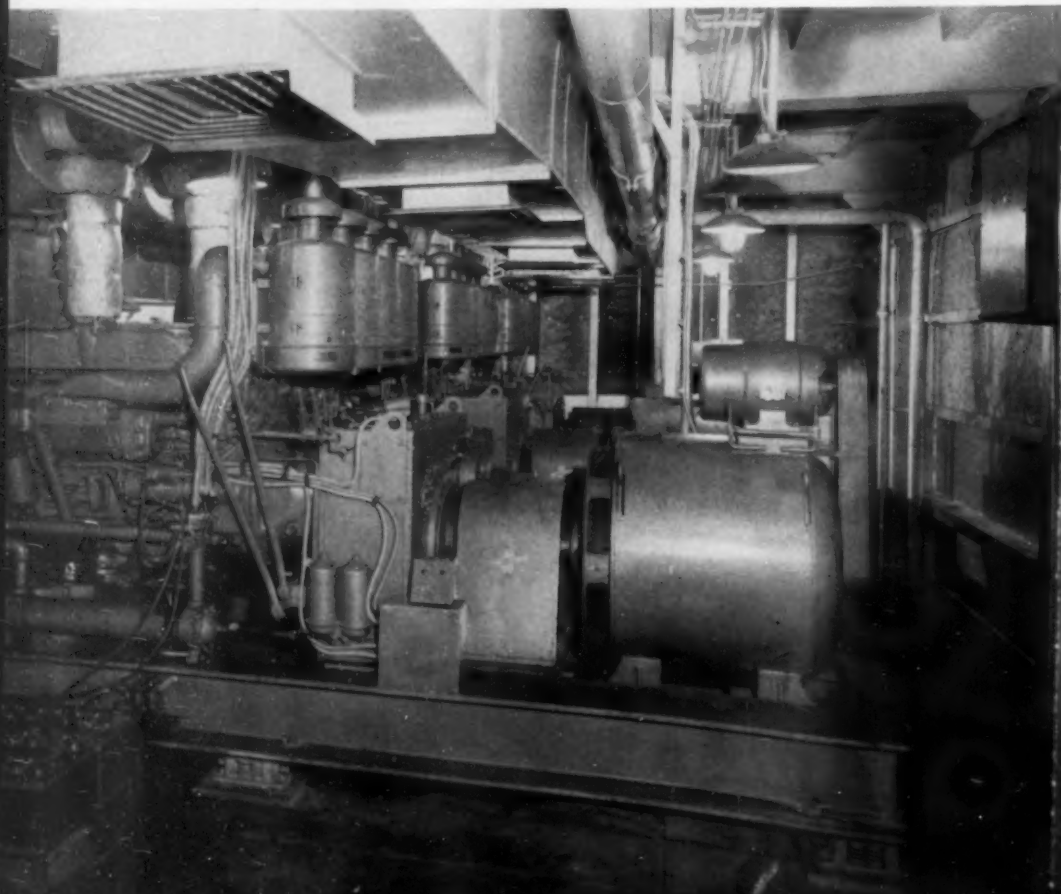
The mammoth drilling equipment on the *Mr. Gus II* which the RIGELECTRIC units power, consists principally of a National 160 drawworks which is driven by three RIGELECTRIC dc electric motors with a combined capacity for hoisting

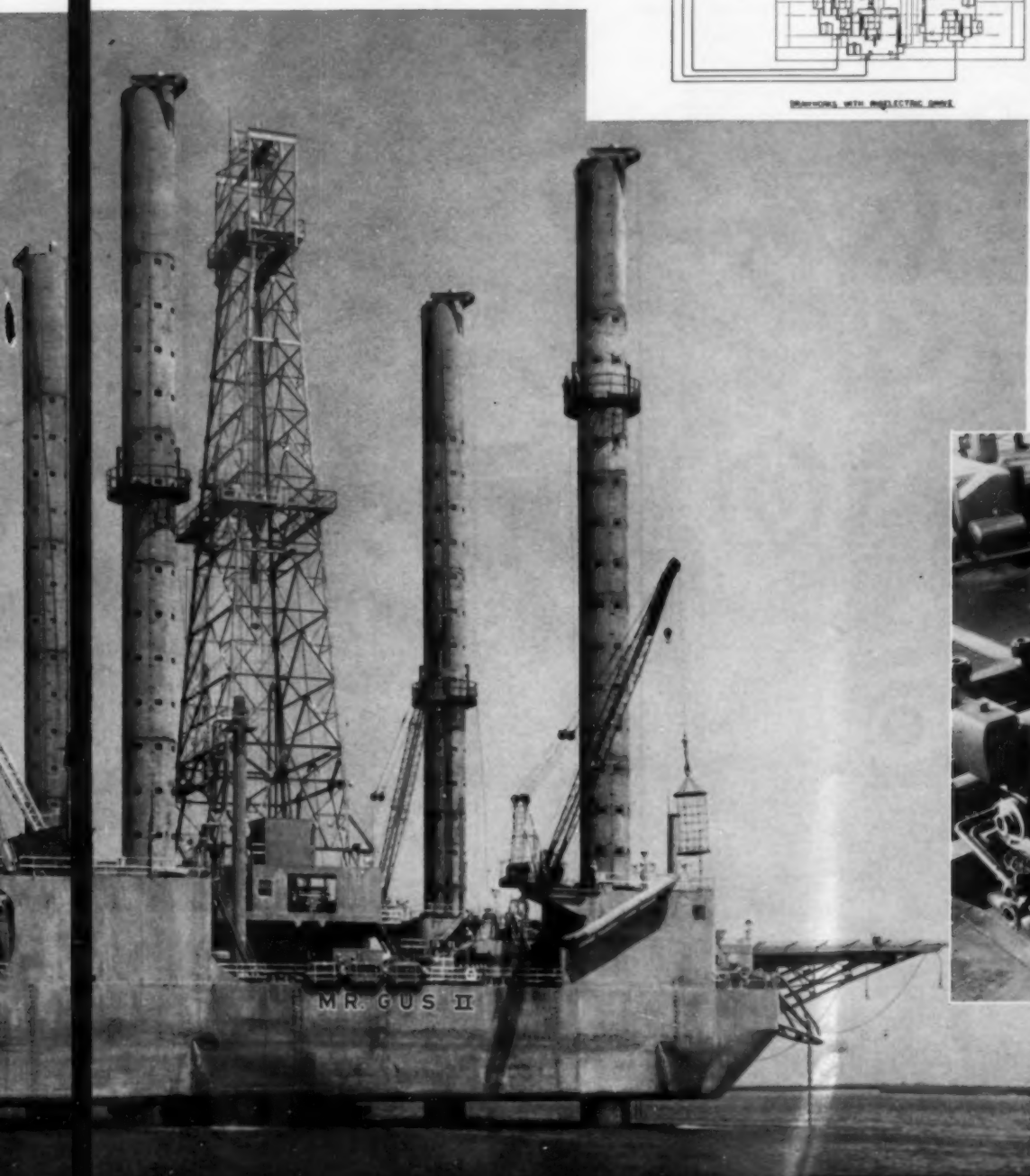
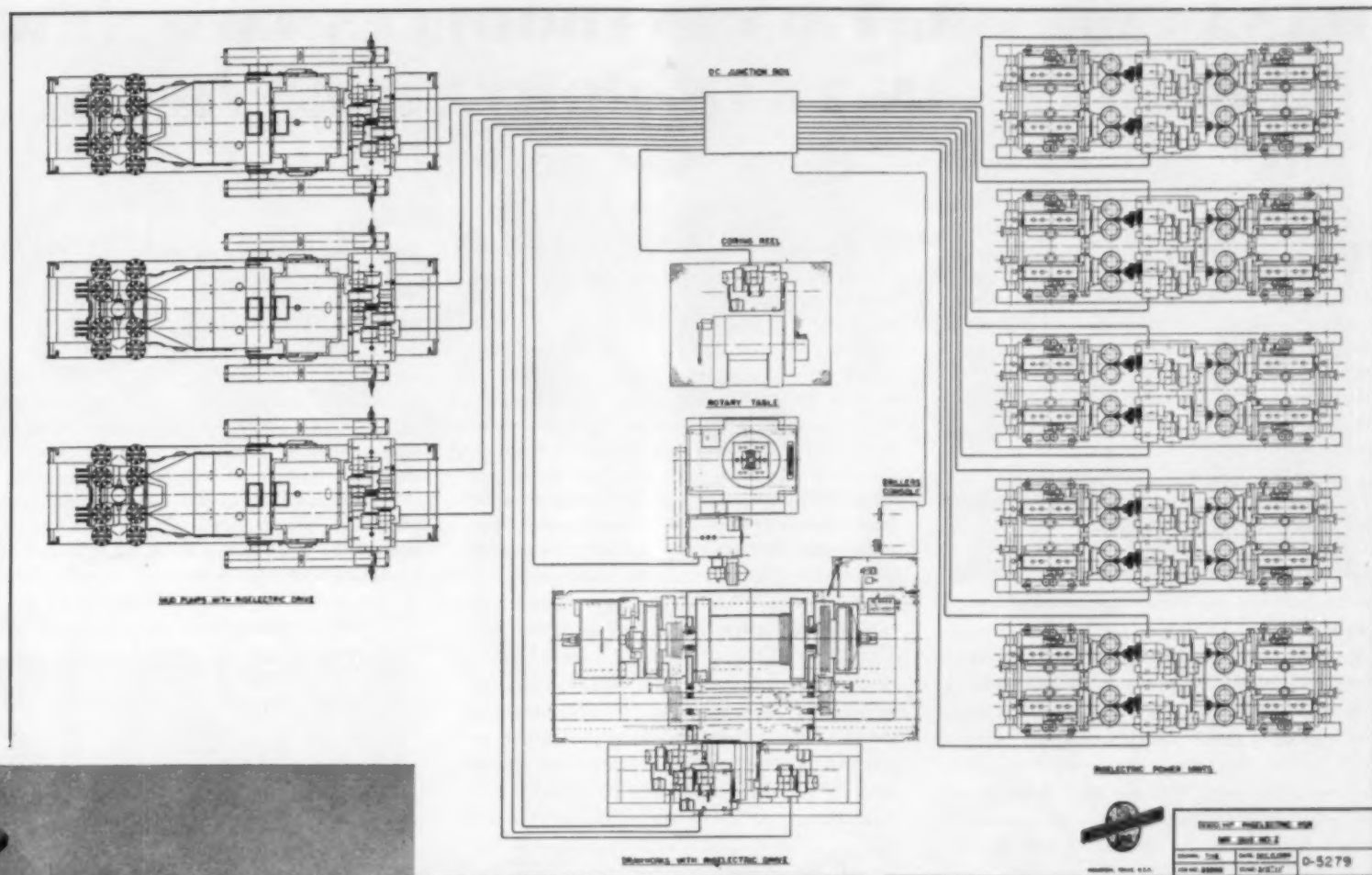
service of 2700 horsepower. The mud pumps consist of three National G-1000 pumps each of which is powered by dual RIGELECTRIC dc electric motor drives with a combined capacity for continuous duty service of 1200 horsepower. The independent rotary table is also driven with an individual dc electric motor as well as the coring reel. Alternating current electric power for auxiliary service and lighting is furnished by three Stewart & Stevenson Model 110-GD300, 300 kilowatt ac diesel generator sets powered by General Motors Detroit Diesel engines. Control equipment for the diesel electric power is Stewart & Stevenson's own RIGELECTRIC control system which provides positive and flexible control with maximum simplicity.

The new *Mr. Gus II* is a three-deck platform. It has been contracted for by the CATC Group. This organization is an offshore exploration and production combine made up of the Continental Oil Company, Atlantic Refining Company, Tidewater Associated Oil Company, and Cities Service Oil Company. The engines which provide power for *Mr. Gus I* and which are largely responsible for the successful drilling record, also are all General Motors Detroit Diesel engines applied and furnished by Stewart & Stevenson Services and they have operated more than 12,000 actual operating hours with no major repairs.

The ac power generator room on board *Mr. Gus II*. There are three such sets aboard, all, of course, supplied by Stewart & Stevenson Services and all engines are General Motors Detroit Diesels direct-connected to 300 kw Delco Products generator sets.

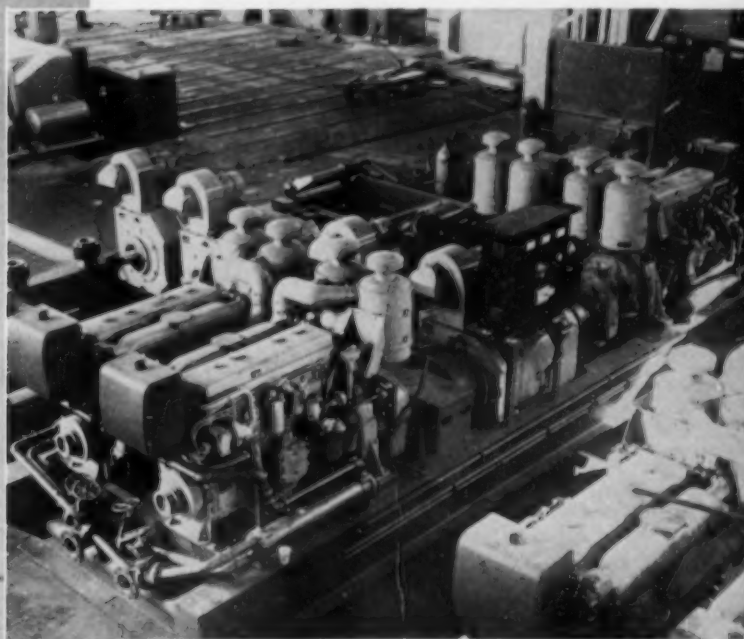
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Layout of the Rigelectric machinery aboard *Mr. Gus II* insofar as the drawworks is concerned. Here will be seen on the right the five Rigelectric units supplying power for the drilling operations.

One of the Rigelectric power packages installed aboard *Mr. Gus II*. This photograph illustrates the compactness and flexibility of this unique combination of Detroit Diesel engines and the experience of Stewart & Stevenson Services in producing for the Oil Industry compact, complete unit power drives.



DANA CORPORATION INTRODUCES TWO NEW PRODUCTS IN TRANSPORTATION FIELD

By JIM BROWN*

THE Dana Corporation has recently introduced two new products which bid fair to advance the adaptability and efficiency of diesel engines in the field of truck and bus transportation. One is the Spicer 183 fully automatic converter transmission, first announced in June 1957; the other is the light weight, compact Spicer Synchro-Master 12 (12-speed) truck transmission introduced this August.

The Spicer Synchro-Master 12 transmission holds great interest as an important development in the trucking field because of the continuing search for shorter and lighter transmissions. Field research indicated that sheer ruggedness and a multiplicity of gear shifts were not the complete answer, so far as truck manufacturers and operators were concerned. A transmission closely suited to the sustaining of high rpm's throughout the range for high-speed diesels was indicated, also "shorter and lighter" was the reply to their inquiries, wherever they went. With the legal limitation of 60 feet overall for tractor-trailer combinations the search has been on for single unit multiple-shift transmissions to be contained in as small a pack-

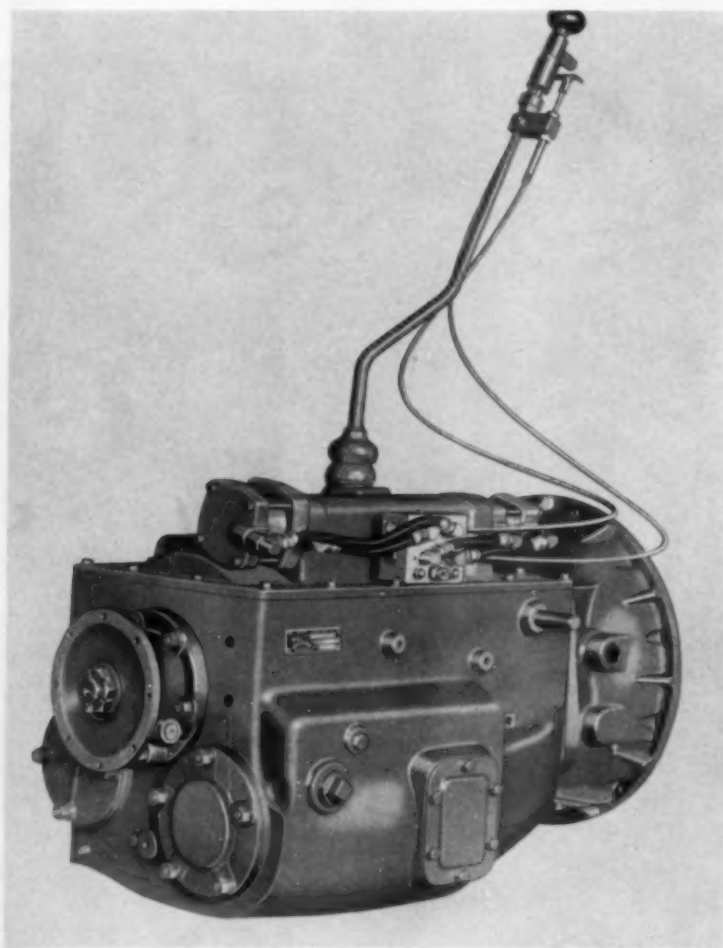
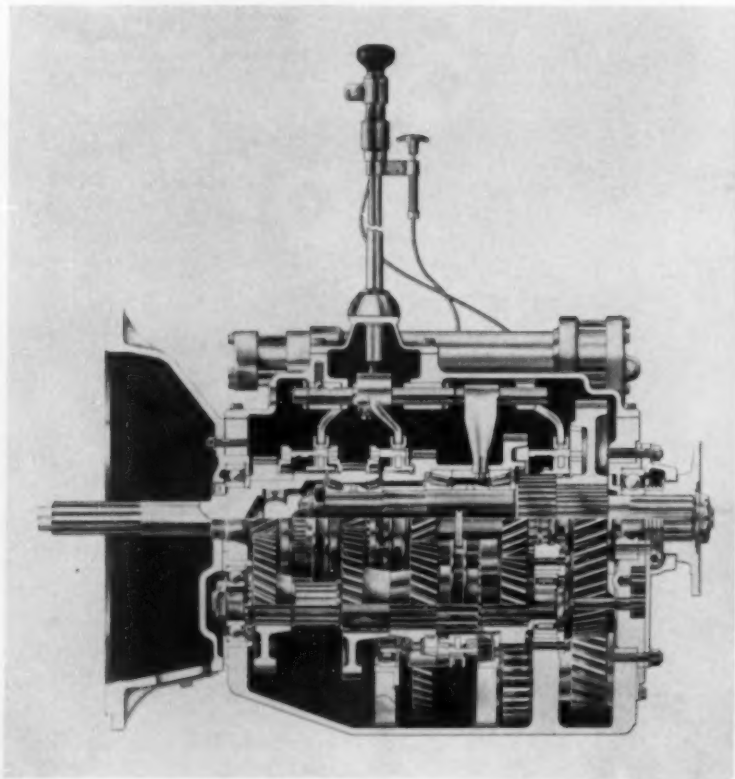
age as possible. Whereas 4 and 5-speed transmissions with 3 and 4-speed auxiliary gear boxes hooked on behind were the popular combination for years, the desire to lengthen the pay-load carrying trailers by shortening tractor lengths has almost entirely ruled such space-eating combinations off the road in new trucks. The wheel-base of the tractors has been successively decreased to about 116" as the minimum—and a side-mounted radiator was required to do this. Now the hoped-for goal is a tractor of about 102" wheelbase, or at least down to 110" or 106". Naturally, every few inches saved for cargo space and every few pounds cut off of engines and transmissions, where it can be done without sacrificing power or utility, is extremely important. While the 2-speed axle was a successful innovation which aided greatly in the development of shorter tractors, Dana Corporation personnel set about developing a transmission that would contain all the necessary gearing for 12 forward speeds in one box—shorter and lighter than any known transmission of such capacity. The result is the new Spicer Synchro-Master 12 transmission, which is claimed to be approximately 200 pounds lighter and 12 inches shorter than any

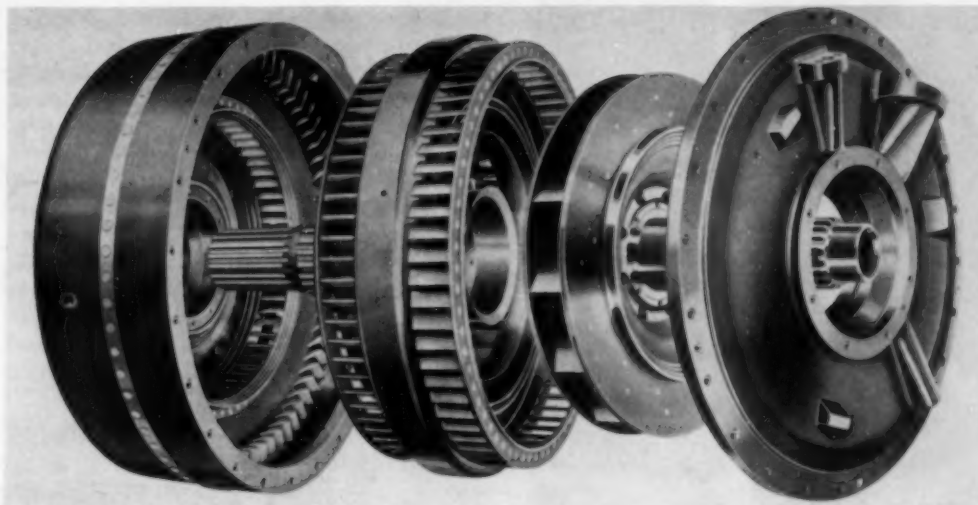
multiple-speed transmission of comparable capacity now being offered.

The Spicer Synchro-Master 12 transmission has pressure lubrication of all gears not actually immersed in oil, by means of a self-contained, gear-type lube-oil pump. Both "range" and "splitter" shifts are air operated, which reduces driver fatigue. The transmission has a normal rating of 700 ft/lbs torque input, with higher ratings allowable for normal all-highway transportation. Gear speeds are synchronized for smooth shifting on this transmission in all speeds forward and reverse by means of blocker-type synchronizers. Reverse speeds are spread over the entire low range, which gives six speeds in reverse. One characteristic of the Spicer Synchro-Master 12 transmission that makes it highly suitable for diesel prime-movers is the small amount of rpm drop between shifts as demonstrated in tests behind a typical 2100 rpm diesel engine. As can be seen in Figure 1, the maximum tachometer variation between shifts was from 2100 rpm to 1635 rpm minimum. Average engine speed drop between ratios figures out at only 26% of the 2100 rpm maximum engine speed, with a maximum drop of 28%.

*Diesel Progress Detroit Editor

Cutaway view of the Spicer Synchro-Master 12-speed transmission. The Spicer Synchro-Master 12 transmission, shown here with "Tower" control is also available with remote control for cab-over-engine and tilt-cab installations. Only 31 in. long, it offers 12 speeds forward and 6 in reverse without auxiliary gearing.





Exploded view of Spicer 183 torque converter. Input pump at left, output turbine to the right.

Figure 5.

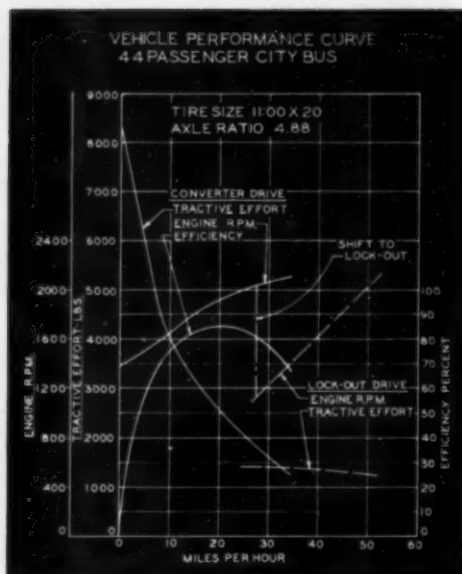


Figure 3.

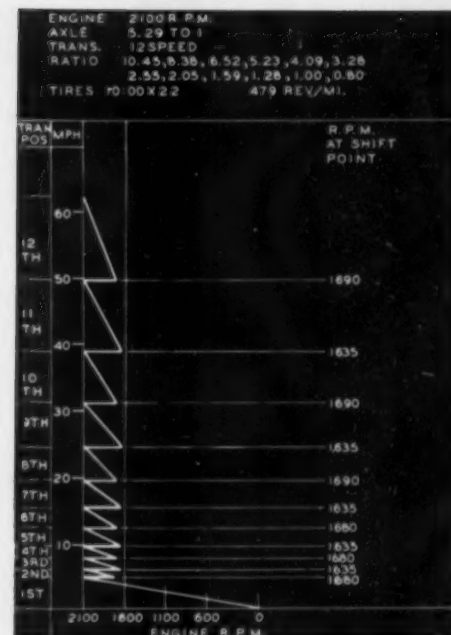
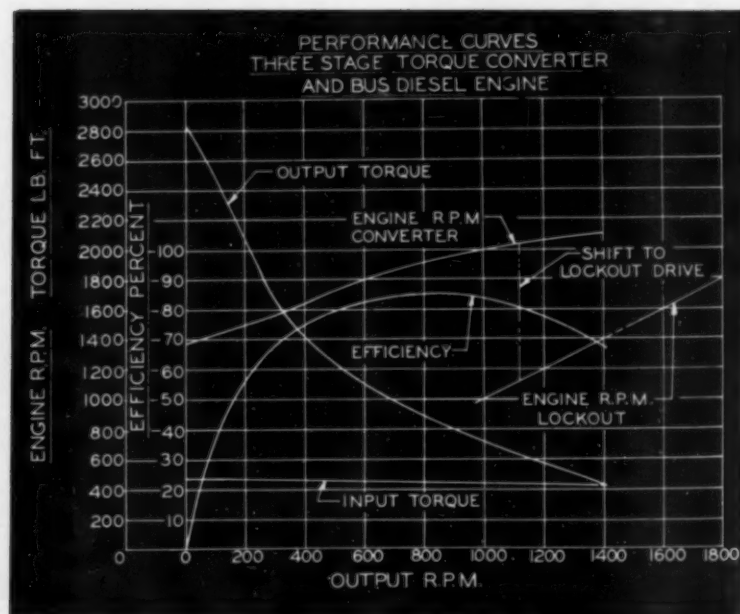


Figure 1—This chart shows engine rpm, gear shifts from a standing start to 60 mph and minimized engine drop in a specific application.

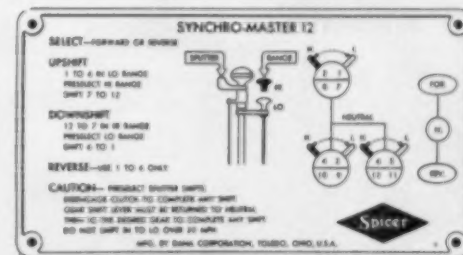
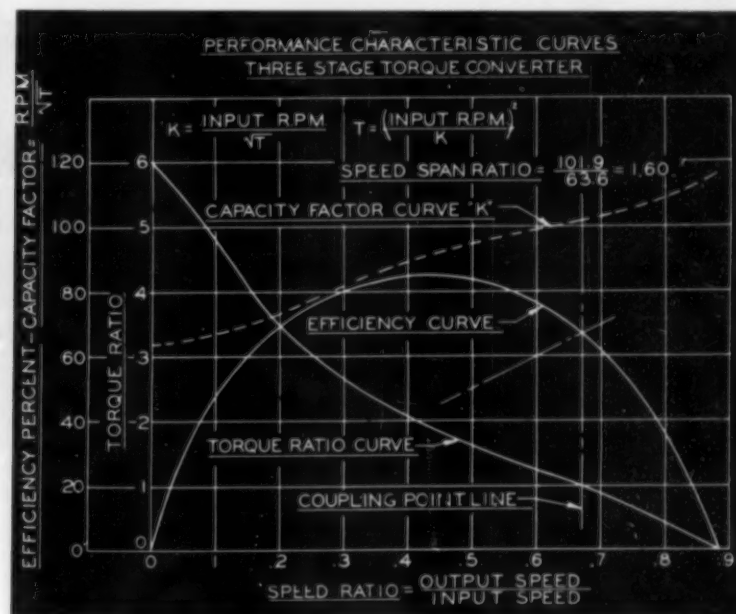


Figure 2.

ratio, when the efficiency curve (as a converter) has fallen off to about 80% and the torque ratio is about 1.5 to 1. In Figure 4 the performance of the Spicer 183 torque converter transmission is shown matched up with the input torque and rpm curve of a particular diesel bus engine of 200 gross specified bhp at 2100 rpm. The overall effect, translated in tractive effort and miles per hour on a specific 44-passenger city bus is shown as Figure 5.

Figure 4.





This is the intake for the 2½-mile McDowell tunnel which carries water originating at the huge Santee-Cooper River hydro project to the F-M propeller pump which lifts it into the impounded area for city use.

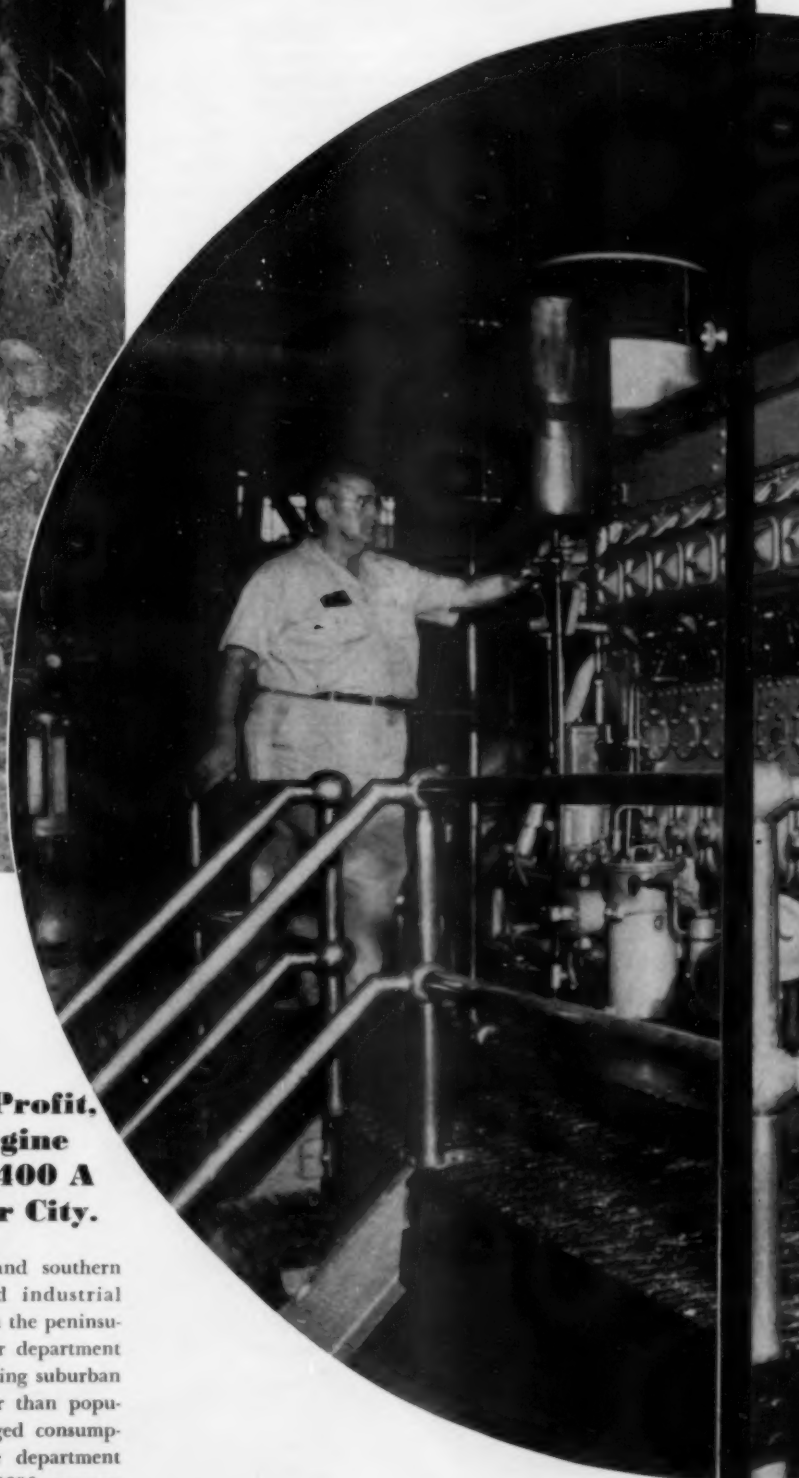
CHARLESTON, S.C.

Diesels in Charleston Municipal Water Plant for Profit, Protection. Fairbanks-Morse Opposed-Piston Engine Eliminates Steam Standby and Reduces Costs \$11,400 A Year; New F-M Pump Taps Huge Water Source for City.

AVAILABILITY of diesel-driven pumps for both low-service and high service pumping has enabled the City of Charleston, South Carolina, to shut down the steam boilers in the municipal water plant with a resultant saving of \$11,400 a year in fuel and labor costs. The City achieved this independence from steam standby with the installation of a 600 hp Fairbanks-Morse opposed-piston diesel to drive a 10 mgd centrifugal pump.

Charleston today blends colonial and southern charm with modern methods and industrial growth. There are 70,000 residents on the peninsula that forms the city and the water department serves as many more in the surrounding suburban area. Use of water is growing faster than population. In 1940, householders averaged consumption of 100 gal. per day and the department pumped an average of 5 mgd. In 1956, average

consumption was up to 200 gal. which combined with population increase to raise the pumping average to 15 mgd. Daily peak reached 26 mg in the summer of 1956. Both basic water supply and pumping facilities have been developed to meet the growing demand. When the city purchased the water plant from a private company in 1917, it contained four steam-powered pumps, two for low service to send water through the treatment plant and two high service units to supply the city. The plant could deliver a total of 10 mgd. A 10 mgd triple expansion steam pump was added in 1925 and steam continued to carry the entire load until 1940 when a 6 mgd centrifugal with 400-hp.



electric motor was installed for high service pumping. The first move to provide the economy and protection of diesel standby equipment was made in 1944 with the installation of a Model 32E12 Fairbanks-Morse diesel rated at 180 hp at 360 rpm. The engine drives through increasing gears at 715 rpm a centrifugal pump (low service) with capacity of 10 mgd. For reasons of economy and operating efficiency, the diesel became a preferred pumping unit and for three years was in operation virtually 24 hours a day. With coal at \$6.00 a ton, fuel cost for the steam pumps was \$2.50 per million gallons. Fuel and lube cost for the diesel was just \$1.50 per mg.

To achieve complete diesel standby protection, the city installed in 1954 a Fairbanks-Morse opposed-piston diesel engine to drive a high service pump with rated capacity of 10 mgd at a 250 ft head. Actually, this unit has delivered as much as 13 mgd. The diesel is a Model 38F5¼ rated at 600 hp. at 1200 rpm. The compact opposed-piston design made it possible to put this heavy-duty engine on the foundation of one of the old steam pumps. The diesel is self-sufficient, with air, fuel and lube filters, heat exchangers, lube and water pumps, and gauge panel mounted right on the engine.

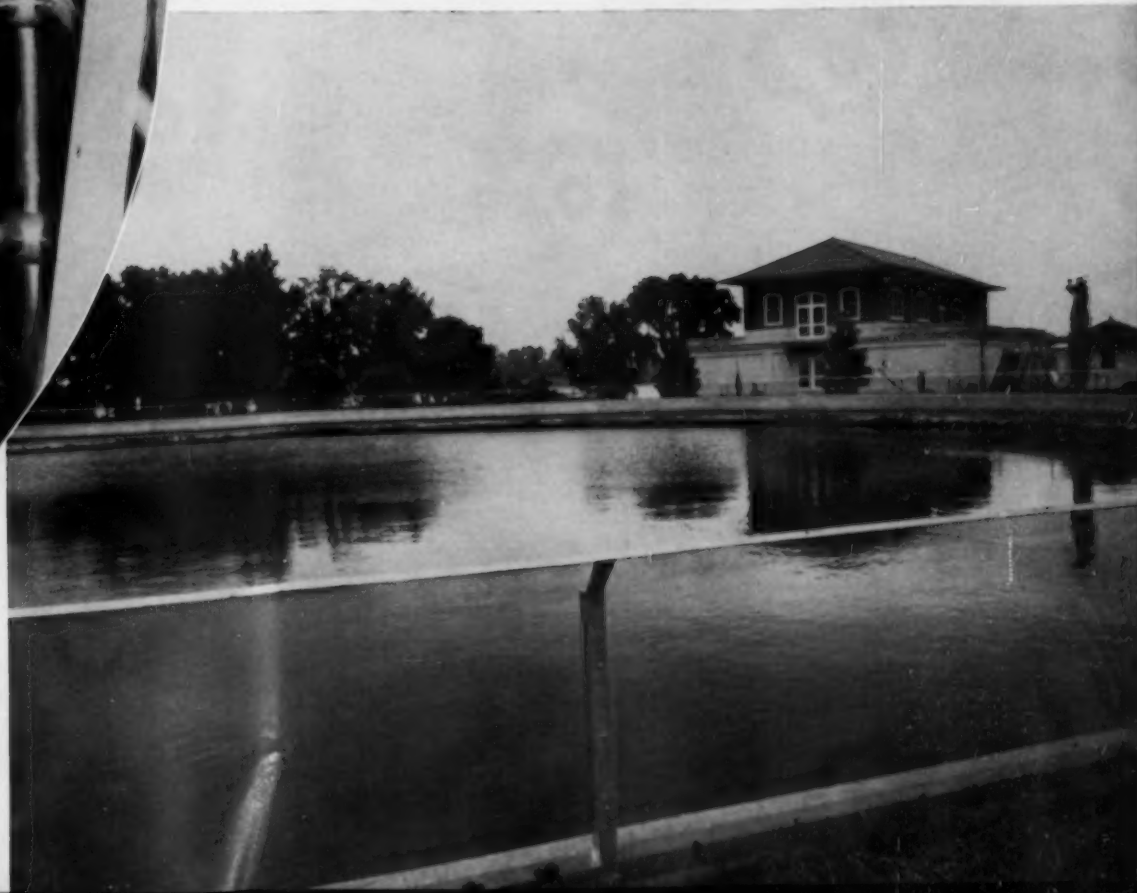
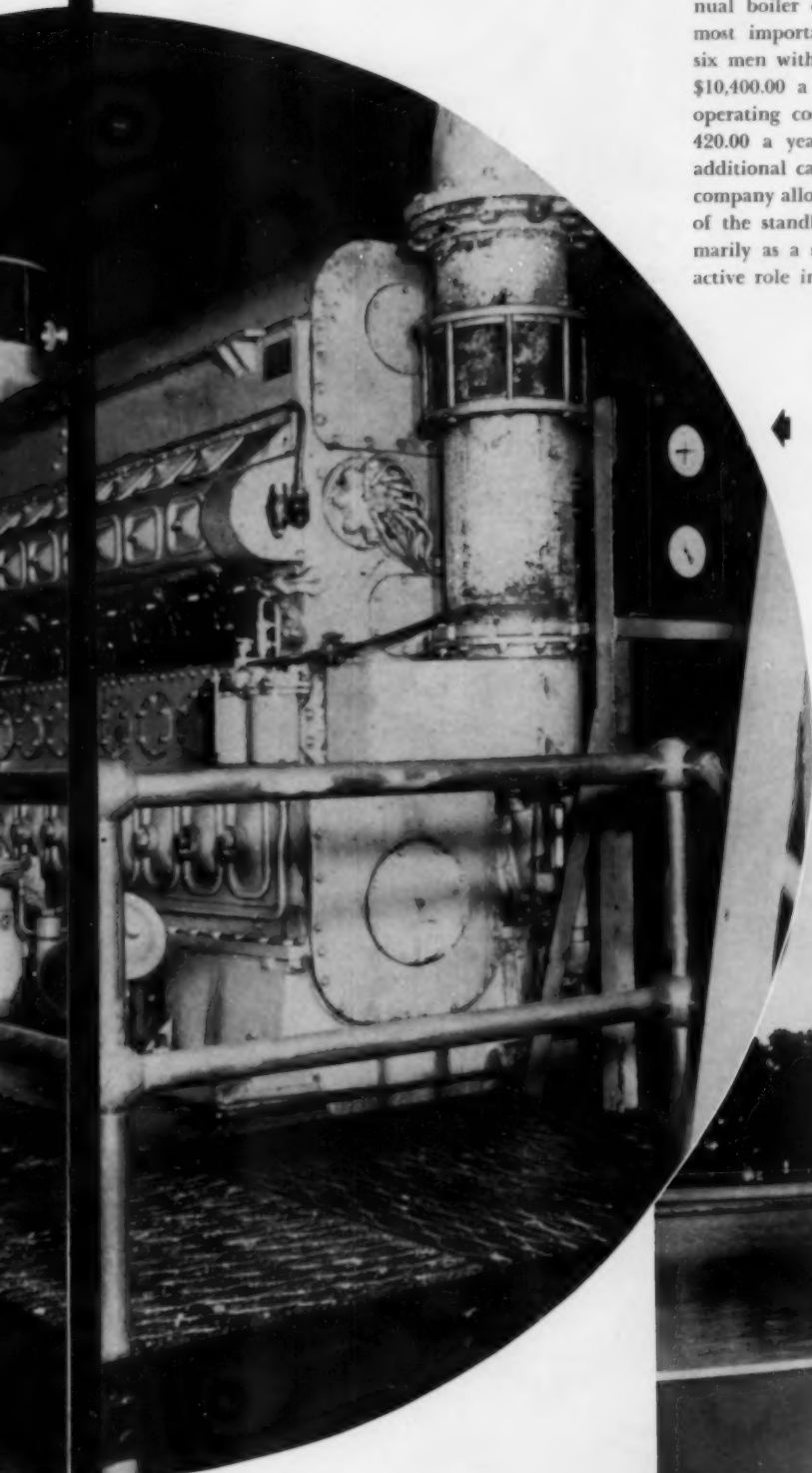
Immediate effect of the diesel was to permit shut-down of the steam boilers. This meant, first, a saving of four tons of coal a month at \$15 a ton or \$720.00 a year; second, elimination of an annual boiler cleaning costing \$300.00; third, and most important, reassignment to other work of six men with a salary total of \$200.00 a week or \$10,400.00 a year. All in all the diesel reduced operating costs of the pumping station by \$11,420.00 a year. Incidentally, a standby unit has additional cash value to the city since the power company allows a discount of \$6,000 a year because of the standby protection. Though installed primarily as a standby, the new diesel has won an active role in plant operations and is actually in

service about a third of the time scheduled for high service pumping. In 1955, the first full year of operation, the unit was on the line for 906 hours and pumped a total of 368,720,000 gal. In a peak summer month like July of that year the engine ran for 191½ hours. Naturally, the diesel performs its primary standby function, ready to deliver full capacity in a minute if electric power puts the motor-driven pumps out of service. In fact, remembering the 1953 electrical storm that put the electric units out for 6 hours, operators make a practice of starting the diesels and shutting down some of the motors whenever lightning flashes across the sky. In other words, the diesel takes a portion of the load until the lightning actually shuts down the electric motors altogether.

The heavier service given the diesel is the direct result of operating economy. In the 12-month period through June 1956, the diesel consumed 65 gal. of fuel oil for each million gallons pumped. With fuel at 10.8 cents a gal., this meant a fuel cost of \$7.02 per mg. Lubricating oil added 32 cents to this figure, giving a total fuel-and-lube cost of \$7.34 per mg. The electric-powered pumps deliver about 1,000 gal. of water for a kilowatt-hour costing one cent or about \$10.00 per mg. Needless to say, these figures do not take into consideration all the costs of either electrical or diesel operation but they are indicative of the basic diesel economy. Policies of this progressive municipal system are formulated by the Commissioners of Public Works: Chairman S. S. Booker, Mayor Wm. McG. Morrison, Herbert R. Stender, C. O. Thompson and Randell C. Stoney. Operations are under the direction of John R. Bettis, Manager and Engineer; James H. Thomson, Assistant Manager and Engineer; and Rufus B. Chapman, Treasurer and Assistant Secretary.

Plant Superintendent C. G. Shipley inspects the Fairbanks-Morse diesel which handles a million gallons of water for a fuel-lube cost of \$7.34. This view shows the Woodward governor, American-Bosch fuel pumps, Air-Maze lube strainer, and Purolator fuel and lube filters.

After treatment, water from this 2-million-gallon basin is pumped to the city by the high-service pumps. The building at the far side of the basin is a new 10 mgd filter building.



DIESEL EQUIPMENT BUSY IN MICHIGAN

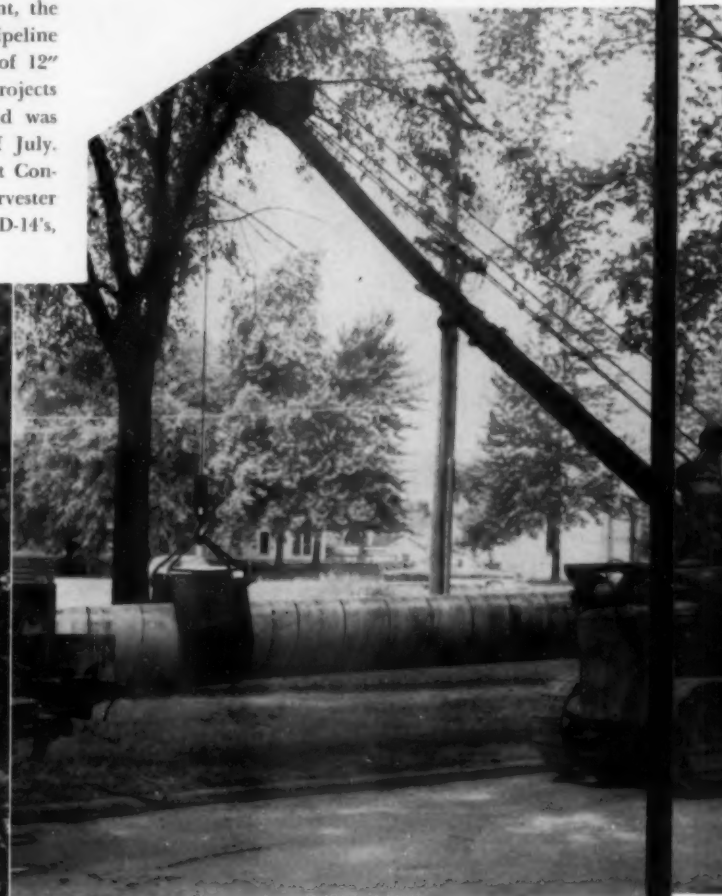
**Eight and a Half Miles of Pipe Line and
Four Miles of Road Add Up to Busy-ness!**

By JIM BROWN*

WITH automotive production being slacked off at every opportunity (by allowing long holiday weekends, etc.) to avoid further glutting of the market, and with private construction slowed down by "tight" money, Michigan's heavy construction men find themselves generally in an enviable position, with plenty to do. In 1956 most of them splurged on purchases of equipment which they are now putting to work. From where we sit it appears that equipment purchases are "off" considerably compared to '56, but for distributors service work and parts sales should rise steadily with the increased use of the machinery bought in 1956, due to the national highway program. What follows is the story of current work being done by two contractors in the Detroit and Bay City Michigan area; not really "big" jobs, but solid, profitable undertakings of one of Detroit's largest pipe-line specialists and a small road contractor who is getting big fast through the judicious application of diesel equipment.

*Detroit Editor—Diesel Progress

Currently working on two pipeline projects in the Detroit area is the R. L. Coolsaet Construction Company, well known contractor from Dearborn, Michigan. Using three spreads of equipment, the two projects consist of 10,000 ft of 24" gas pipeline on the East side of Detroit and 35,000 ft of 12" pipe on the West side. The work on both projects was begun early in June of this year and was scheduled for completion in the middle of July. Among the equipment working for Coolsaet Construction Co. are eight International Harvester crawler tractors, three of which are model TD-14's,



An I.H. TD-9 crawler holds a length of pipe in position for welding (East side.)

A model 15-B Bucyrus-Erie backhoe powered by an I.H. UD-250 diesel excavates a ditch on the East side for the 24" pipe.



An International 2T-55 Scraper and a TD-24 bulldozer removing dirt along the right-of-way for Blue Water Excavating Co.



A TD-9 crawler with the help of a side-boom lifts the 12" gas line into position for welding at a tie-in at the West side location.

Here a "cherry-picker" holds up the pipe while another one hooks a cable on the end and slides the pipe down the ditch.

and five TD-9's, and a Caterpillar model D7 crawler. A Bucyrus-Erie backhoe powered by an I. H. model UD-250 and a Michigan truck-mounted crane are being used on the East side job for excavating. At the East side location work was temporarily halted about two blocks from the starting point. The obstacle was a 9'3" cylindrical sewer which was too near the surface to be overpassed without bringing the pipe up higher than the 5-foot depth specification. The solution was to cut a notch 3 feet into the sewer and "re-seal" it, after the 24" pipe was laid, with concrete reinforced with steel beams. After this obstacle, other things such as water seepage, tree roots, chunks of concrete and water mains were just "small irksome tasks" for the East side crew.

On the West side, where two crews were working, the 12" gas pipeline was being laid along the paving about three feet from the curb line. Streets and driveways in this highly developed residential

area presented problems as the pipe lengths were generally much longer than the open spaces. Cool-saet Construction thus found it necessary to do a lot of tunnelling and to slide long lengths of pipe into place under streets and driveways. First a relatively open space was found in which to work. Two pipes were welded together, a plug was fitted tightly into the end of the first one, and the two lengths were lowered into the ditch. A cable was then looped around the front end of the pipe and the I.H. TD-14 tractor with a "cherry-picker" boom pulled the two lengths under the driveways. One end remained exposed so that the next length could be welded. After enough lengths had been added in this manner and another open space was reached at the "plugged" end, the last welded length was lowered into place for a tie-in and the cycle began again, with the welding equipment and cherry-picker moved on down the line.

Figures published by the Michigan State Highway Department show nearly 20% more dollar value of contracts let in the first few months of 1957 than in 1956. One of the projects contracted for, near Bay City, Michigan involved 4 miles of grading for a 2-lane asphalt road. The job is being completed by the Blue Water Excavating Company of Port Huron, Michigan. The State Highway Project No. M 79022 CIR begins on route M38 in the town of Juanita and runs Southeast to Mayville, Mich., ending about a mile West of Mayville. The project was begun by Blue Water Excavating on March 25th, 1957 and includes 210,000 yards of excavation. Earth excavation began on April 18th and the entire project including

the 22 ft "double-seal" asphalt lanes is now completed. Blue Water Excavation was low bidder on the project and will sub-let the paving to another contractor in Detroit. Jim Little, one of the foremen at the road-site and a former student of civil engineering at the University of Michigan has employed three model 2T-55 International Harvester Payscrapers push-loaded by an I.H. TD-24 'dozer for most of the excavating work. The drainage ditches alongside the 8 ft shoulders were excavated by a P & H dragline crane powered by a model D526 Caterpillar diesel. An I.H. model TD-18A cable bulldozer was also used on push-loading as well as shoulder work and various other jobs. A Warco model 4D-100 grader powered by an I.H. diesel did the grading work. Two new scrapers: a Euclid twin-engine TS-18 and an I.H. 2T-75 were being tried out by Blue Water on a temporary basis. The 4-mile project, improving what was formerly a dirt road, is being constructed to extend the asphalt paving on M38 from Vassar to Mayville, Mich. Before the double-seal coat of asphalt is laid, the road base will be covered with 1½ ft of sand, excavated from two borrow pits, one located at each end of the project. The scrapers will be used to compact the layer of sand to 95% controlled density as required by the Michigan State Highway Department. Other projects that Blue Water Excavating has worked on during the past year include several roads and parking lots at a power plant for the Detroit Edison Company on the St. Clair River; an excavation project for a Sewage Disposal Plant on the St. Clair River for Detroit Edison Co. and a stretch of highway in Port Huron, Michigan.

A DIESEL-ELECTRIC SELF-UNLOADER

By DOUGLAS SHEARING



Steamer W. W. Holloway leaving Christy Corporation Dock at Sturgeon Bay, Wisconsin on maiden voyage after conversion to self-unloader.

Christy Corporation, Sturgeon Bay, Wisconsin has completed the conversion of the Steamer W. W. Holloway, owned and operated by the Columbia Transportation Company, Cleveland, Ohio, from a bulk freighter to a diesel-electric self-unloader. The operation of the converted Holloway will be watched very closely by all people interested in self-unloaders, as it opens up an entirely new phase of self-unloader conversion. The self-unloading rate of the Holloway is 3,500 tons of limestone per hour. This high speed rate of un-

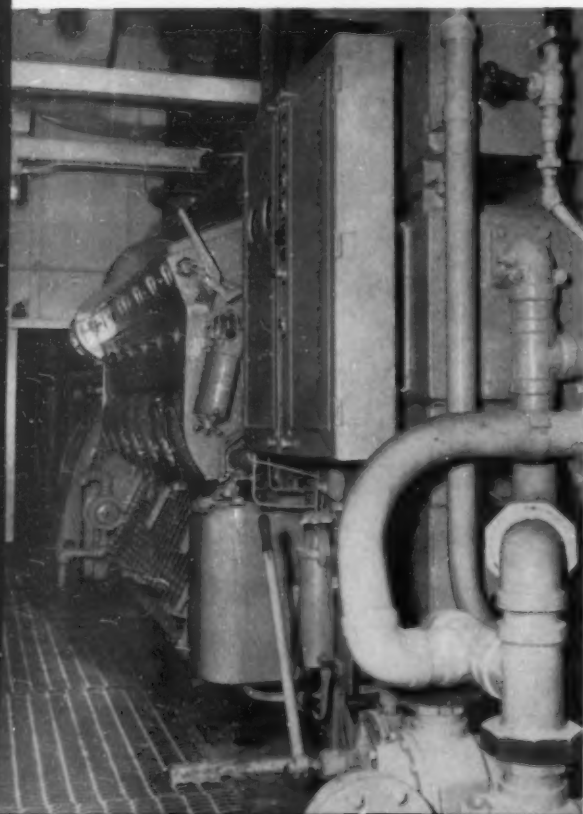
loading was made possible by the use of a patented bucket elevator designed by John F. Meissner & Son, Chicago.

The Holloway has a length of 552 ft, a beam of 56 ft, and a depth of 318 ft. The draft at midsummer loadline is 21 ft 7½ inches. In her converted condition as a self-unloader, she will carry 10,153 short tons of coal in four separate compartments. The general arrangement of the converted vessel is that of a typical Great Lakes self-unloader of the belt type. The tank top was removed and a new lowered tank top installed throughout the cargo hold. Side tanks were removed and side tank slopes on a 35 degree angle installed. A centerline tunnel with top sloped 35 degrees was installed. This tunnel is supported by a new centerline bulkhead which was welded atop the existing center vertical keel. One new transverse bulkhead was added. Between the new side tanks and centerline tunnel, hoppers were installed transversely with a 35 degree slope, spaced on six-foot centers, port and starboard. There are a total of 61 hoppers on each side of the vessel. The hoppers follow the curvature of the hold conveyor belts which rise 21 feet 5 inches at the forward end of the vessel. The cargo hold hopper openings are closed by heavy steel gates carried by means of small wheels mounted on rails following the curvature of the hold conveyor belts. These gates are operated pneumatically from the centerline tunnel. Air cylinders were supplied by Anker-Holth Company. The gates, which were manufactured by Christy Corporation, control feeding of the cargo onto two 42 inch rubber hold conveyor belts, each driven by a 150 hp Louis Allis Company motor through a Falk reducer. A belt travel of 450 feet per minute provides an unloading rate of 1,750 short tons of 90 pound limestone per hour for each belt. The hold conveyor belts discharge at the forward end of the vessel into

a cross chute that loads the bucket elevator. The cross chute is lined with removable abrasion-resistant steel plates. A 24-inch-wide spill conveyor rubber belt on each side, driven by a 3 hp Louis Allis motor, which gives a belt travel of 300 feet per minute, carries the spillage from the hold conveyor head pulley belt wipers to the bucket elevator of the unloader.

The bucket elevator rises on a 45 degree incline from a sump in the tank top to discharge into a hopper in the elevator housing. The bucket elevator consists of 64 buckets, 30 inches center to center and 96 inches wide, mounted on wheels and connected by a drive chain of 7½ inches pitch centers. The bucket elevator is driven by two 150 hp Louis Allis Company motors and two Falk Company speed reducers. The bucket elevator discharges into a circular hopper and a chute which is circular at the top where rollers are provided to enable it to swivel with the swinging of the boom. Both the chute and hopper are lined with removable abrasion-resistant steel plates. A 245 foot conveyor boom receives the cargo from the elevator and discharges by means of a 54 inch rubber conveyor belt driven by one 200 hp and one 150 hp Louis Allis motor through Falk reducers. A belt speed of 625 feet per minute provides a total unloading capacity of 3,500 short tons of 90 pound limestone per hour. The boom is topped by means of a Clyde Iron Works steam hoist. The hoist is mounted on the bridge deck of the vessel aft of the pilothouse. Hoist cable is a single cable, one inch diameter, 1,600 feet reeved through a Sauerman Brothers Company lower sheave nest, with 22 sheaves and two Sauerman Brothers Company upper sheave nests with 10 sheaves each, and two load sheaves. The upper sheave nest is connected to the upper pivot casting atop the "A" frame by means of four 2 inch diameter cables reeved through the two load blocks

The installation of the 1,000 hp General Motors Electro-Motive Division, 440 volt ac, 750 kw diesel generating plant.





➤ The above photo shows the 245' boom swung out over the port side of the W. W. Holloway.

◆ From left to right are: Arthur Sullivan Jr., President of Gartland Steamship Co.; Chicago, Illinois, Henry Wiersch, Marine Superintendent of Columbia Transportation Co.; Cleveland, Ohio, C. R. Christianson, President of Christy Corporation; Sturgeon Bay, Wisconsin, Al Cozzens, Vice President of Columbia Transportation Co.; Cleveland, Ohio.

on each of the upper sheave nests. To drive the unloading machinery, a new 1000 hp General Motors Electro-Motive Division, 440 volt ac, 750 kw diesel generator plant was installed. Switchboards and control cubicles were fabricated for the ac plant by Christy Corporation.

The "A" frame is a tripod type frame developed by John F. Meissner Engineers, and fabricated by Christy Corporation. The back leg is pinned at the upper end to the upper pivot casting and the lower end continues through the forward quarters and attaches to heavy girders at the intersection of

the forepeak bulkhead and the fore deck. The supporting girders continue on to the stem and keel. The side legs of "A" frame continue through the spardeck and distribute their load into the shell and framing. The upper pivot casting is arranged with the sheave nest on top to lead the hoist rope to the hoist winch. Upper and lower boom castings were furnished by the Erie Forge & Steel Company. Quarters in the forward end of the vessel were completely removed and rebuilt, and a new pilothouse was installed. A penthouse with quarters for twelve men was added aft on top of the existing spardeck house. Quarters in the lower spardeck house were renovated to provide individual rooms with baths for the engineers. The existing ship's dc power plant was removed and two 60 kw turbine generators installed with a new switchboard fabricated by Christy Corporation. All engineering required for the conversion was handled by R. A. Stearn, Naval Architect, who has offices in the plant of Christy Corporation. John F. Meissner Engineers were retained by R. A. Stearn as special consultants.

A COUPLING WITH A RUBBER TIRE

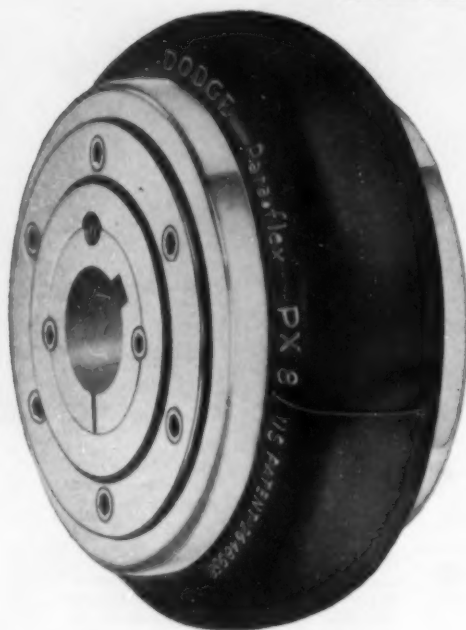
By DOUGLAS SHEARING

PARA-FLEX, is described as a wholly new conception in flexible couplings by the Dodge Manufacturing Corporation, Mishawaka, Indiana, as the latest addition to its line of power transmission machinery. The ability to handle angular misalignment, parallel misalignment and end-float, and in any combination, is only one of many ad-

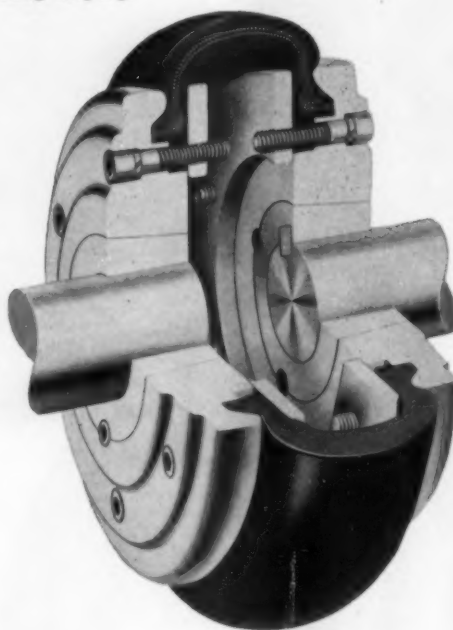
advance in the manufacture of modern automobile and truck tires, engineered to carry tremendous loads at high speeds and stand terrific shocks. The four-way flexing body of Para-flex outperforms the most complex coupling mechanisms, yet operates with the simplicity and dependability of a modern tire. In addition to its many operational

mounted on the shafts to be coupled. The flexible member is held between the flanges and clamp rings of the hubs. Both hubs of the coupling are machined to take Taper-Lock bushings. These give the equivalent of a shrunk-on fit on the shaft and permit quick and easy application to shafts of different diameters without costly reboring. The tire

Para-flex Flexible Cushing Coupling.



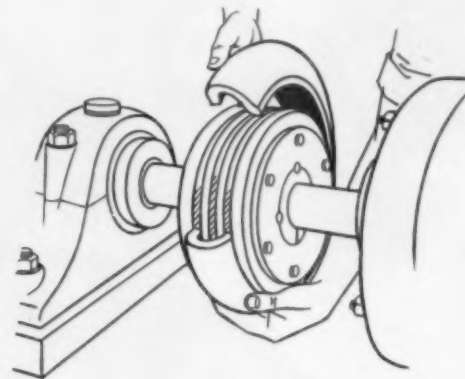
Full view



Cutaway view



Cutaway section showing tension members in Para-flex coupling tire.

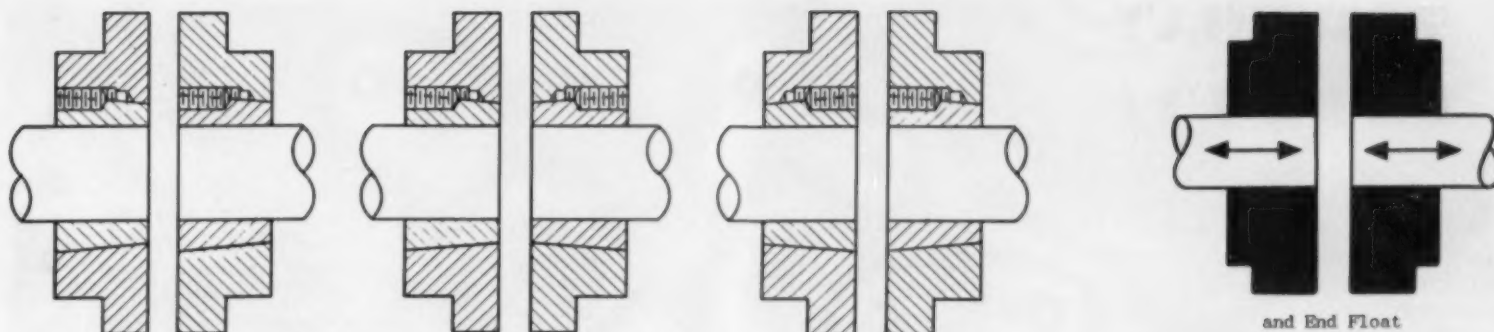


The flexing member can be replaced without moving driver or driven machine.

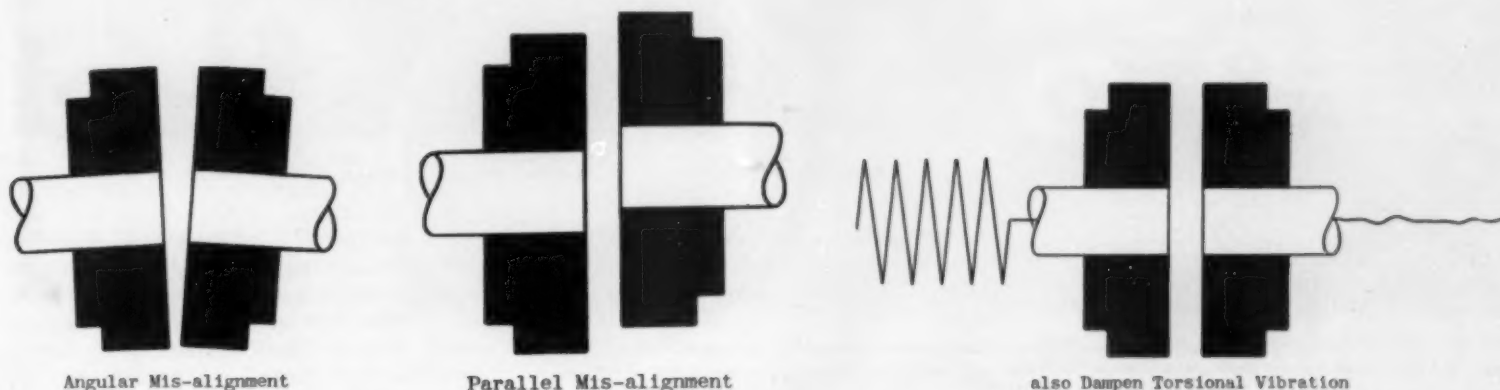
vantages claimed for the coupling. The flexible member also cushions shock loads and diminishes torsional vibration, thus protecting both the driver and the driven machine. Heart of the Para-flex Coupling is a tire with synthetic tension members bonded together in rubber. In fact, this new coupling has been made possible by the technological

advantages, Para-flex has other highly desirable features of installation and maintenance never before available in a flexible coupling. Like most advances in engineering design, Para-flex is essentially simple and this simplicity contributes to its dependability. The coupling consists of the flexible tire clamped between two hubs which are

has a transverse split molded into it, which permits easy installation and makes replacement possible without moving driver or driven machine. To make a change it is only necessary to loosen the cap screws enough to allow removal of the tire and to fit a new one in place. Even in very confined spaces this simple operation can be accomplished in a few minutes. According to Dodge engineers, Para-flex will take angular misalignment up to four degrees, parallel misalignment up to 1/8 inch, and end-float up to 5/16 inch—contingent upon the size of the coupling and the duration of the conditions—or it will take all of these simultaneously. The resilience of the flexible member cushions shocks to a remarkable degree, smoothing out the load for both driver and driven machine. Torsional vibration developed by internal combustion engines, the amplitude of which increases greatly at critical points in the speed range, is absorbed to a great degree. Because there is no metal-to-metal contact in the Para-flex Coupling, it requires no lubrication. No maintenance or regular inspection for lubrication is needed. Safety is promoted by flush design—all cap screws are countersunk, metal surfaces are finished all over, there are no protruding parts. The coupling is designed to occupy a minimum of space on the shaft. Para-flex, developed in West Germany, has already been proved in thousands of installations there. Dodge has adapted the new development to the standards of American industry. Para-flex Couplings will be stocked by Dodge distributors in popular transmission sizes. They are available from factory stock in capacities up to 600 horsepower at 900 rpm.



Three arrangements for mounting Para-flex couplings with Taper-Lock bushings.



Angular Mis-alignment

Parallel Mis-alignment

also Dampen Torsional Vibration

NEW TURBODIESEL ENGINE

CUMMINS Engine Company has announced production of a new 450 horsepower TURBODIESEL engine for use in pumping units, locomotives, marine equipment, oil well drilling rigs, shovels, and electric power generation.

The Cummins LRT-6 TURBODIESEL broadens the horsepower range of the slow speed, heavy duty L engines offered by Cummins. Previous models in the L series developed 250 and 300 horsepower.

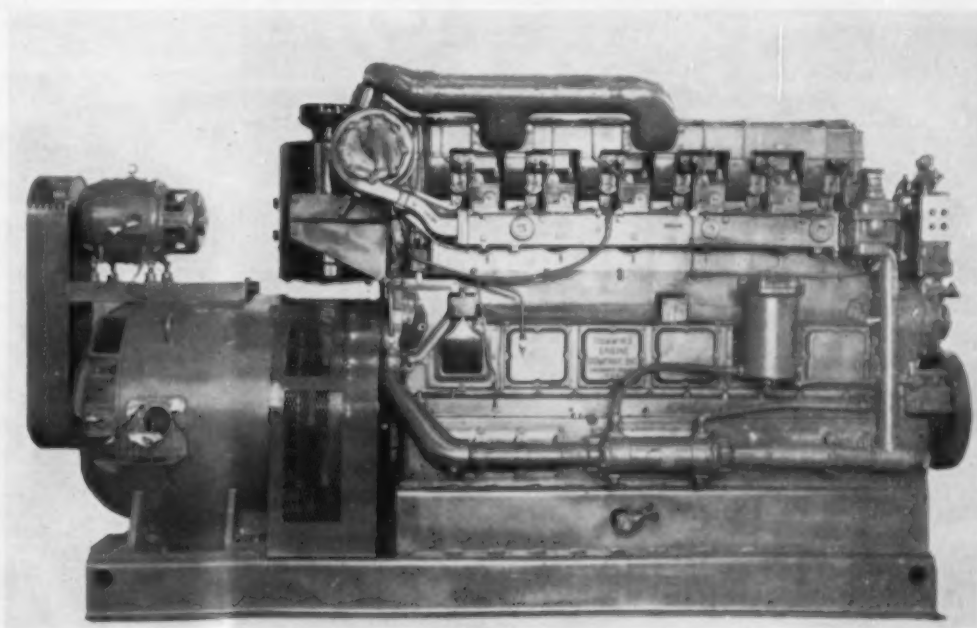
"In recent years, many inquiries indicated demand for a slow speed engine of high horsepower, and the new Cummins TURBODIESEL engine is designed to fulfill that need," said C. R. Boll, Vice President-Sales. "We foresee this model as meeting a real power need in oil field applications, industrial generators, pumping units, and other heavy duty industrial work where high horsepower, high torque engines are required."

The Cummins TURBODIESEL engine utilizes normally wasted energy of exhaust gases, by means of a turbocharger, to develop additional horsepower. A turbine, located in the exhaust system, drives a centrifugal blower in the air intake system. By forcing a greater weight of air into the cylinders, more fuel can be burned completely and more power developed.

The LRT-6 has a rating of 450 horsepower at 1100 rpm and has displacement of 2477 cubic inches. It is a six cylinder engine equipped with a Cummins T-590 turbocharger and has the famous Cummins PT (pressure-time) fuel system. The PT principle of fuel metering utilizes a fixed size opening in a simple injector and variable pressure to meter the fuel charge.

The LRT-6 (industrial) is 99 5/16 inches long, 39 5/16 inches wide and 58 3/4 inches high. The LRT-6 (power unit) is 136 1/16 inches long, 53 5/8 inches wide and 86 1/8 inches high. Weight of the engines is 7690 pounds for the LRT-6-I and 12,100 pounds for the LRT-6-P. The weight figures include standard accessories.

A new addition to the Cummins line of turbocharged diesels is this 450 hp model LRT-6 rated at 1100 rpm with a displacement of 2477 cubic inches.



TOWBOAT

HAWKEYE

ALREADY making an enviable name for herself is the new 2480 hp towboat *Hawkeye* which recently went into service for the Midwest Towing Company. Designed and built by the St. Louis Shipbuilding & Steel Co., the 150 ft x 33 ft-6 in. *Hawkeye* joins her year old sister-ships the *Arrowhead* and *Prairie State* in the Mississippi River coal trade. The hull is heavily framed, both transversely and longitudinally, with $\frac{3}{8}$ in. plating on the bottom and sides and $\frac{1}{2}$ in. plating at the bilges and tunnels. The bulkheads are $\frac{3}{8}$ in. thick, stiffened both vertically and horizontally. The easy stern lines, an outstanding feature on St. Louis Ship boats, permit a smooth flow of water to each of the 102 in. propellers. The pair of massive Kort Nozzles were designed for the heavy duty coal trade.

Two Cooper-Bessemer Type JS-8-T 13 in. x 16 in., 4 cycle turbocharged marine diesel engines provide propulsion. Each engine is rated at 1240 bhp at 458 rpm and through Falk reverse-reduction gears turn the four blade cast steel propellers at 180 rpm. Cooling of the main engines and generators is provided by circulating the jacket water through St. Louis Ship closed skin cooling ducts. There are also installed Ross lube oil coolers and Wartenbe lube oil filters. American Air Filter oil bath type air filters are installed also. Two powerful steering systems of the St. Louis Ship mechanical-hydraulic type are installed on the *Hawkeye*. One system controls the two steering rudders and the other controls the four flanking rudders. The system is so designed that the rudders can be turned hard-over to hard-over in 12 seconds while towing. The *Hawkeye* is equipped with two General Motors 100 kw 3/60/440 volt ac and 20 kw dc diesel generator

View of pilot house showing console with main engine, steering and searchlight controls and the R.C.A. Radar.



Profile of M/V *Hawkeye*. Note American Air Filter oil bath air filters behind stacks.

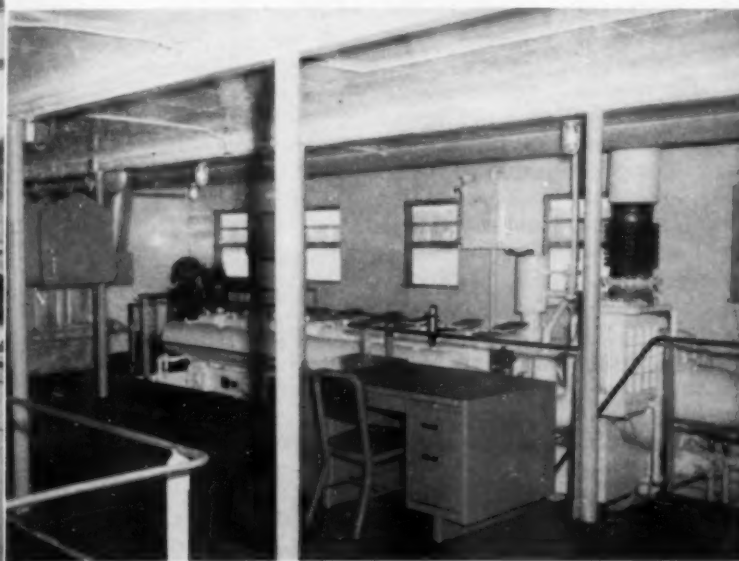
sets. A dead front switchboard provides for control of the generators and distribution of power. Air for main engine starting, Airflex clutches and air whistle is furnished by two 23.5 cfm Quincy Air Compressors driven by 5 hp motors. Two double barreled capstans manufactured by Schoellhorn-Albrecht are each driven by a 10 hp Fairbanks-Morse motor with Cutler-Hammer controls. The two 15 ton hand winches located on the forward deck, are manufactured by Patterson Winch & Supply Company.

The spacious, modern deckhouse of the *Hawkeye* is of all-welded $\frac{3}{4}$ in. steel construction with steel partitions at the forward and after ends of the engine room. All exposed surfaces are insulated with 2 in. of Microlite insulation, and the lining and partitions throughout are $\frac{1}{4}$ in. tempered Masonite. The double hung steel sash and full screens are made by the Truscon Division of Republic Steel Corp. Except for the ceramic tile in the bathrooms, the floor covering throughout is Armstrong Cork, Greaseproof Asphalt Tile. The

galley of the *Hawkeye* is fitted with the most modern equipment including a Hotpoint electric range, an 82 cu ft Tyler refrigerator, a 20 cu ft Tyler deep freeze chest, and an 8 cu ft G.E. night refrigerator. Built in cabinets with stainless steel counters and a walk-in pantry provide ample storage space.

The pilot house console contains the main engine and gear controls, two pairs of steering levers, tachometers and gauges. Two 19 in.-45 amp. Carlisle & Finch Arc Searchlights are located on the roof controls from the pilot house. An 8 in. Triplex Kahlenberg Bros. air whistle is located on the pilot house roof. The Radar is Model CR104 and the Radio-Telephone, Model ET-8050-HF, both made by Radiomarine Corporation of America. The *Hawkeye* has a Webster intercommunication system and a Webster Public Address System. From the exceptional performance already displayed by the *Arrowhead* and the *Prairie State*, the sister-ship *Hawkeye* should prove to be an outstanding pusher for the Midwest Towing Co.

Upper engine room looking aft showing the starboard Cooper-Bessemer JS-8-T main engine.



New Compressor Station For Needles

Preliminary earth work has begun at the site of a huge compressor station near Needles, California, designed to push out-of-state gas through the new 30-inch natural gas pipeline now being constructed between Needles and Newhall, it was announced by F. M. Banks, President and General Manager of Southern California Gas Company. The multi-million dollar plant, designed by M. A. Nishkian & Co., consulting engineers, is being built by the Southern California and Southern Counties Gas Companies 11 miles south of Needles and about eight miles west of the California-Arizona border. Actual construction work, Banks stated, is scheduled to begin May 1st. Part of a vast \$33.5 million transmission system between Needles and Alhambra, the new compressor plant is designed to handle the daily load of 278.2 million cubic feet of gas that will be transported into Southern California when the project is completed later this year. According to Banks, the plant will initially house four or five 2,000 horsepower, turbo-charged Clark compressors planned for the station. Eventually, the plant is expected to contain 10 compressors. Con-



Needles Compressor Station Plant No. 1, Southern California Gas Company and Southern Counties Gas Company of California, Los Angeles. Tenants in common. Consulting Engineers are M. A. Nishkian & Company.

struction of approximately 244 miles of pipeline between Needles and Newhall—the major portion of the overall project—is more than one-fourth finished. Actual work has progressed some 70

miles west from the California border, crossing the Amboy-Needles Road west of Essex. Overall, the new line including a 49-mile segment between Alhambra and Newhall completed last fall, will

stretch approximately 285 miles. According to current schedules, the line and new compressor station will be completed and in operation by the time this article appears in print. **ITS NEW**

Allis-Chalmers New Motor Scraper

Allis-Chalmers is expanding its line of motor scrapers with the new hydraulic 7 cu yd struck, 9.5 cu yd heaped, 12-ton payload, Model TS-160 rated at 155 hp. This new scraper matches power with big scraper strength, and features easy maneuvering, visibility, speed and economy for a wide range of construction

and maintenance jobs, for work in close quarters, for land reclamation and soil conservation projects and wherever a scraper of this size is needed. The TS-160 has an Allis-Chalmers 6 cylinder, 516 cu in. displacement, supercharged diesel engine rated 155 hp at 2200 rpm. A one-piece all-steel tractor frame gives

rigid support for engine, clutch and transmission and provides easy accessibility to these components for service without disturbing adjacent parts. Final drive housing is an all-steel, precision-welded structure that is stress-relieved and line-bored for true alignment of all gears, shafts and bearings. Five-speed constant-mesh transmission fully utilizes the high torque output from the engine. Forward speeds range from 3.1 to 25.4 mph and reverse at 3.1 mph. The TS-160 carries 66 per cent of its weight on the drive wheels when empty and has equal weight distribution on all four wheels when loaded. This assures better traction, flotation, and stability on the job. Two-speed hydraulic steering with 90-degree steer each way is a feature. The tractor can swing into a right-angle turn with only a 1/6 turn of the steering wheel. A complete non-stop turn is made in 24-ft, 8 1/2 in. A slight turn of the steering wheel regulates the pump flow to the steering jacks for smooth, gradual turns on haul roads. A relief valve in the steering system protects the hydraulic system from excessive shock loads if one of the tractor wheels hits an obstruction. Full-

flow filtering insures clean hydraulics and efficient operation of all controls. Two powerful double-acting bowl lift jacks exert down pressure at the cutting edge for fast penetration of the hardest materials and rapid action in lifting the bowl out of the ground. Three-piece cutting edges are interchangeable and reversible for long life and high production. The low, wide-bowl design features a curved one-piece steel bowl bottom. This curvature lessens loading resistance and creates a live material action that results in heaped loads fast. Apron opening of the bowl is 85 1/2 in. and width of cut is 97 1/2 in. Depth of cut ranges from 0 to 24 3/4 in. and depth of spread is 0 to 16 3/4 in. Height of bowl sides is 44 in. The positive forward forced ejection and high apron lift provide fast, smooth, high-speed spreading. As the ejector moves toward the cutting edge, bulldozing material out of the bowl, the linkage moves the apron forward and upward at the same time to the large opening. All controls including the hydraulic scraper controls are within easy reach of the operator. **ITS NEW**

The new Allis-Chalmers model TS-160 hydraulic motor scraper. Its capacity is 7 cu yds struck, 9.5 cu yds heaped, 12-ton payload. The 6-cylinder Allis-Chalmers supercharged diesel engine is rated at 155 hp.





GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

Dr. T. W. F. Brown's Remarkable Statement and What it Means.

DR. Brown, as Director of Pametrada Research Station, is a recognized leader in the field of marine turbine design, not only the latest in steam but also in advanced gas turbine projects. His statement made at CIMAC* is "The primary object of the work on turbine cooling at Pametrada has been the development of a gas turbine capable of operating at very high gas temperatures, of the order of 2,200° F, in order to obtain a substantial improvement in performance, while maintaining the temperatures of all loaded metal parts at low temperatures and therefore able to develop high stresses and still give long life. The improvement in performance obtainable in this way is dependent on the magnitude of the heat losses incurred in cooling the turbines, but preliminary calculations have indicated that a thermal efficiency of over 40% may be obtainable at a maximum cycle temperature of 2,200° F, with a specific air flow approximately one third of that obtained with the same cycle at a maximum temperature of 1,250° F. Higher gas temperatures than 2,200° F become uneconomical owing to the increase of cooling losses with still higher gas temperatures."

Before pointing out what this statement means to future power production equipment let us see what this liquid cooled gas turbine is. The full scale unit as proposed in the paper has a single stage high pressure turbine which is the unit cooled by liquid metal in the blades. This turbine wheel (driving the high pressure compressor) is adjacent to the intermediate pressure turbine rotor which drives the propeller or load. The hot gases then go to the low pressure turbine unit located near by. This drives the low pressure compressor. A heat exchanger is used to heat the air prior to its entering the combustor. An intercooler is used between compressors. There is no reheat. This is the equipment in Table I. "Of the various possible methods of cooling the rotor blades, the

closed thermo-syphon system has been chosen as being the most suitable and effective. A liquid coolant sealed within the hollow turbine blades transfers heat by natural convection from the heated part of the blade to the root, the rate of heat transfer being maintained at a high level by the intense centrifugal field. The heat is then extracted from the blade root by a secondary coolant which may conveniently be water. The most suitable primary coolant appears to be sodium-potassium alloy of about eutectic composition. This has a specific gravity of only 0.74 and is liquid within the temperature range 12°F to 1,443° F."

It is a simple matter of pouring the liquid metal into the blades and then welding a cap onto the blade providing this is all done in a special box containing helium. The one I saw was about 30 in. x 30 in. x 30 in. Research is now being extended to passages of non-circular cross-section within the blade. The test turbine comprises a ceramic lined water cooled stator fitted with ceramic nozzles and an overhung single stage rotor. The vertical combustion chamber comprises of four horizontal flame tubes, two on each side, exhausting into it. This arrangement enables the individual flame tubes to be lit up or shut down one at a time, thus mitigating the thermal shock on

the refractory blading, and also eases the problem of changing a faulty sprayer without shutting down the engine. Mixing is satisfactory, the maximum variation in gas temperature at the turbine inlet branch being +38°F to -60°F from the mean temperature of 2,200°F. Owing to the large temperature rise through the combustion chamber the quantity of air available for flame tube cooling is much reduced, and the flame tubes as well as the mixing zone, are refractory lined. Any chips from the refractory or elsewhere go to the bottom of the unit while the hot gases come out the top. The experimental programme on this unit includes the testing of alternative designs of rotor blading, and the examination of various types of cooled fixed blading as possible alternatives to the use of ceramics. The liquid-cooled gas turbine is clearly still at the experimental stage, but the progress to date has been such that one may look forward to the development of a full-scale unit in the not too distant future.

Now let us see what the figures of Item 4 in Table I mean. First note this table is based on 10,000 shp. For units of 100,000 hp and up the steam turbine will reign supreme. For units of 1000 hp, and particularly below it is difficult to see how the liquid cooled gas turbine will be economical in the near

TABLE I — COMPARATIVE MACHINERY INSTALLATIONS OF 10,000 SHAFT HORSEPOWER IN A SINGLE SCREW SHIP

| Data of Machinery | Present Designs | | | Future Designs | | |
|-------------------------|-----------------|------------|-------------|----------------|------------|-------------|
| | 1 G. T. | 2 Steam | 3 Diesel | 4 G. T. | 5 Steam | 6 Atomic |
| Weight tons | | | | | | |
| Propulsion | 165 | 345 | 495 | 113 | 152 | 510 |
| Total | 670 | 810 | 1120 | 610 | 620 | 1000 |
| Engine room | | | | | | |
| Length—feet | 40.0 | 52.5 | 65. | 40.0 | 45. | 50. |
| Recess—feet | 17.5 | 7.5 | 0. | 7.5 | 0. | 0. |
| Volume—Ft. ³ | 91,600 | 92,200 | 128,000 | 84,200 | 88,700 | 98,600 |
| Liquid fuel* | | | | | | |
| lb.-s.h.p.-Hr. | .493 | .53 | .38 | .39 | .50 | — |
| Tons per day | 53.0 | 55.8 | 40.75 | 41.75 | 53.5 | 11.25*** |
| % Thermal Eff.** | 27.9 | 26.0 | 36.2 | 35.3 | 27.5 | — |

* "Congres International des Machines a Combustion" held its meeting in Zurich, Switzerland, the week of June 17, 1957 where Dr. Brown presented his paper, "Development of the Long-Life Marine Gas Turbine", from which quotations are taken.

*Consumption for propulsion only
**Including transmission loss (based on H.C.V. of fuel)
***Oil-fired superheater
1—Gas turbine inlet temperature 1250°F, pressure ratio 13.6 to 1.
2—Steam turbine pressure 650 P.S.I.G., 950°F, 28.5" Hg.
3—Turbocharged diesel, 6 cyl. Doxford, 28" bore

4—Liquid metal cooled gas turbine inlet temp. 2200°F, pressure ratio 15 to 1.
5—Steam turbine, turbocharged boilers combustion pressure 4.5 atmospheres, 650 P.S.I.G., 1200°F, 28.5" Hg.
6—Steam nuclear plant, 350 P.S.I.G. saturated, oil fired superheat outlet 750°F.

future. For the immediate future it does fit into the 10,000 hp field which may include 2000 to 20,000 hp. The gas turbine of Item 1 will of course be replaced by Item 4 as soon as it's ready. Again we must realize Item 4 will not be ready for at least 5 years and in the meantime Item 1 should replace Item 2 and for that matter Item 5 is little better than Item 1, primarily improved by the use of the gas turbine pressurized boiler. Item 3 is one of the best methods to-day of burning heavy oil, and to get the best results a gas turbine supercharger is used. It is true that much lighter weight diesels are in the making to-day but it's questionable if these will burn the same heavy oil. However these future engines may not need to burn the heavy oil but a lighter grade at a slightly higher price may be economically preferred. In any case the diesel will have a gas turbine, at least for supercharging.

In conclusion we find that Items 1, 2 and 3 are eventually eliminated. Item 5, to give the best results, uses a gas turbine to pressurize the boiler. Item 5 will be continued, not only for limited classes of marine service, but particularly where steam is required in industrial power plants. Regarding Item 6 Dr. Brown states "The nuclear reactor would be of the pressurized water or organic liquid moderated and cooled type . . . and should have a maximum life of fuel elements . . . for two years in ships operation . . .". One might think that due to the rapidity of development in the nuclear field Item 6 will be replaced as soon as Item 4 is made commercial. This is possible but not probable; item 6 will no doubt use the high temperature liquid cooled gas turbine some years after the perfection of Item 4 which uses only liquid or gaseous fuel.

Eastern Diesel Observations

By Arnold B. Newell

Satellite Stations

IN the field of oil pumping we now hear some new terms. One is satellite station and the other is supervisory system. The satellite station is one in which the powerful diesels are operated without an attendant in the plant. They are in fact self operating under remote control from headquarters a hundred or more miles away through the medium of the supervisory system which receives the signals over telephone wires and distributes them to the proper panels in the plant to start or stop the engines, speed them up or slow them down and manipulate the valves in the pipe line pumping arrangement as more or fewer pumping units are cut into or out of series operation. With the supervisory system one wire will carry any number of signals at the same time. Signals can be sent in both directions simultaneously. These signals activate solenoids which in turn operate switches to start or stop motors which then open or close valves. The diesels under remote control and the station in which they operate

are so adequately equipped with safety devices as to make damage to them impossible. Included in the protective devices are the conventional protection against overheating and loss of oil pressure. In addition they are automatically stopped and locked out of a restart until an attendant arrives by the following: loss of crankcase vacuum, stoppage of the engineroom ventilating system, overheating or loss of oil pressure on the reduction gear set or the main line pump bearings. Mainline pump leakage to the sump will also cut the engines.

Everything that goes on in the plant is indicated by lights on a panel which are duplicated at headquarters. The engines respond to the signals in the same way that electric motors in other stations respond. As a matter of fact some of them are synchronized with electric pumping. If the supervisory connections are destroyed by a storm, the engines continue working under automatic control until line repairs are completed. In talking with operators of such stations I was informed that the telemeter-electro control system and the self operation of diesels under remote control eliminates the element of human error; that saving in wages is a factor but not the most important one; that there is no robot substitution for good operators and mechanics in checking engines and maintenance of proper running conditions, and that the engines are just as dependable under remote control as they are with an attendant by their side. Automatic operation of small engines is not new. When several thousand horsepower in a single plant is placed under remote control the market expands for the very best protective devices. There is too much at stake to trust anything but the best. At the same time the diesel opens up an expanding market for telemeter equipment. In most cases it brings the local telephone company into the picture. It demands the very best lubricants and the most efficient oil filters. Jacket cooling water must be treated with extra care by extra good softening equipment. Push button control of big diesel plants is a far cry from the days when it took all hands and the cook to get an engine on the line and tuned up for the performance of its appointed task.

Starters and Spark Plugs

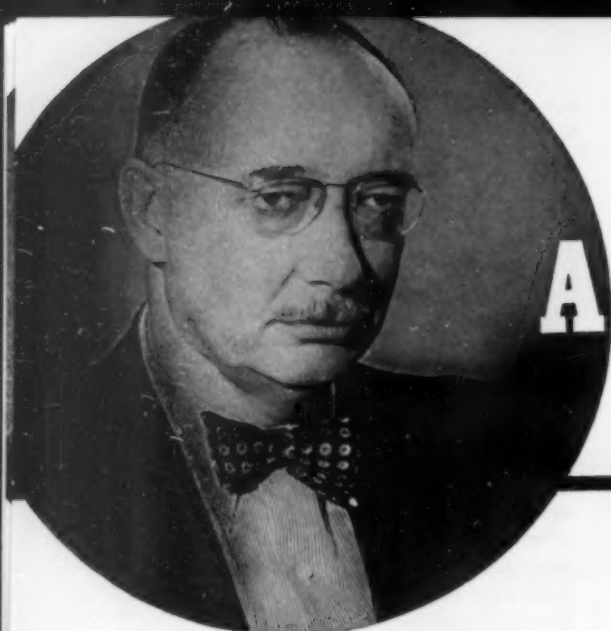
These two items of equipment deserve considerable attention by engine manufacturers sending their engines into humid areas. By engines in this instance, I mean spark ignition gas burning engines of the basically heavy duty diesel type equipped to burn natural gas and all other types normally employing cranking equipment. Ordinarily, the man with an automobile forgets about his starter and spark plugs both of which give little trouble. Dieselized vehicles have very little starter trouble. In other applications the starter is a critical item. There are many thousands of engines constantly exposed to the weather and they may have trouble with electrical systems. As a result both pneumatic and hydraulic starters are commonly employed in open field work. Engines in the oil fields burning natural gas can and often do use pneumatic starters and gas under pressure instead of compressed air to drive them. The reason for using pneumatic instead of electrical starting is better ability of mechanical equipment to

resist action of weather and moisture. Spark plugs are another matter. In some instances a certain model of engine may be a diesel, a dual fuel or a spark ignition gas engine. If it is the latter, not any old spark plug will work. In one plant with upward of 1500 hp installed, the only difficulty encountered in a year and a half was spark plug trouble. This is nothing new. In fact it has been difficult to find satisfactory spark plugs for many other plants. Others report no such difficulty. Still others say that they had it but finally solved the problem by finding plugs of the right make. There is no doubt a lot to that. The fact remains that little public information is given out regarding spark plugs. In the matter of fuel injection equipment, if the entire diesel industry and all the owners and operators do not know all the particulars it is because they do not read. In the matter of spark plugs important information is not so freely given. It should be.

Valve Lash Control

In the normal course of engineering events the functioning of valve lash control systems has been well presented. However I am of the opinion that some of the simpler aspects of these systems may be stated without encroaching upon professional domain. There appears to be a prevalent impression that valve lash control is primarily a noise suppressor when as a matter of fact decibel reduction is of secondary importance. The more important matters can be understood readily by noting the normal changes which occur in an engine every time it is raised in temperature from stone cold to full operating heat. First the valves and stems heat up, particularly the exhaust valves, and expand more rapidly than the block. This changes tappet clearance. The block then heats up and another change in relative expansion causes a different tappet clearance. Finally the lube oil heats up the push rods and still a third dimensional change occurs. Valve lash control compensates automatically for these changes. Cams are designed to start valves opening slowly and close them gently as the tappet starts riding the cam toe and leaves the heel. Too much clearance causes the cam to hammer the valve open and drop it with a crash. Too little clearance causes wire dragging and burned valves. With a properly adjusted engine derangements of either of these kinds may occur during the warm-up period. Cams and valves suffer briefly during these periods and the cumulative effect of repeated starts may cause dished and leaking valves and other maintenance problems that are eliminated or substantially reduced by control of valve lash. The mechanisms employed for this purpose are much more than noise eliminators.

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AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY MERRILL C. HORINE

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Automotive Diesel Control - Part One of Two Part Article

DIESELS, in contrast with gasoline engines, differ somewhat as horses differ from mules. A horse can be goaded to strain himself to death, whereas a mule will exert himself only so far and then quit. Sustained torque at low speed is the characteristic of the diesel which enables it to pull persistently when an equivalent gasoline engine would stall. Part of this difference arises from the broad tolerance of fuel-air ratios which enables the diesel to fire when the proportion of fuel to air is excessive, contrasted with the narrow range of fuel-air ratios within which a gasoline engine will fire. Added to this is the fact that ignition of the diesel charge is even better at lugging speeds, when it becomes less certain in the gasoline engine. This attribute of the diesel has long been marked and appreciated, being sometimes described as tenacity or staying power; but it is not an unmixed blessing. History is full of examples of the noble steed running its heart out to carry its master to his destination in the nick of time.

While horsemen appreciate this equine faithfulness, good horsemen, for the sake of the well-being of the animals, avoid its exploitation. Diesel drivers are not always so considerate. In no application is the diesel exposed to such abundant opportunity for abuse as in the automotive field, particularly hard pulling at low speed. Consequently means of protecting the engine against its own eagerness is receiving an increased share of attention.

Stop Control

First in importance, among diesel controls, is means of stopping the engine, since without a way to quickly shut off the supply of fuel or of air, the engine will continue to operate. In the event of derangement of the injection system such that governor control ceased to be effective, such stop control is essential to prevent the engine running away. A runaway gasoline engine is easily stalled in such cases by merely applying the brakes with the transmission in high; but to stall a diesel under such circumstances is not only more difficult, but will result in shock and strain on both the engine and drive line of considerably greater

severity. Usually, but not always, two stop controls are used. The first is the Normal stop control, usually effective either on the governor, or, in the case of separate injection pumps on the metering control directly. For emergencies, such as a stuck metering control, an Emergency stop control is also usually supplied. Simplest of these is a simple shut-off cock on the fuel supply line. In most cases the control button on the instrument board permits the fuel to be shut off; but to open the cock again, it is necessary to turn it at the engine.

This provision is for the purpose of reminding the driver that before attempting to re-start the engine, it will probably be necessary to prime the injection system. An alternative Emergency stop control acts upon the air supply of the engine, consisting of a flap valve which closes off the intake manifold. This, too, usually requires re-setting at the engine, although there appears to be no reason why it should not work both ways from the driver's station.

Maximum Speed

Next in importance to stop control is maximum speed limitation. This, of course, is the principal function of the governor. For a long time it has been recognized that overspeed can be extremely damaging to an engine and that present governors are able to do only a part of the job. The most destructive type of overspeed is that which occurs in descending grades, where the engine is depended upon to act as a retarder. To augment the retardation of the engine it is general driving practice to shift to a slower gear at the top of the grade. This, in far too many cases, results in engine speed considerably higher than that at which the governor is set, with no restraint on the part of that otherwise useful accessory. Various means have been proposed by which an engine-driven governor might be used to limit the vehicle's speed in descending grades. Presumably these would act upon the brakes or one of the various forms of hydraulic, electric or friction retarders; but up to the present these ideas have not been developed to a state of practical application.

Running Speed

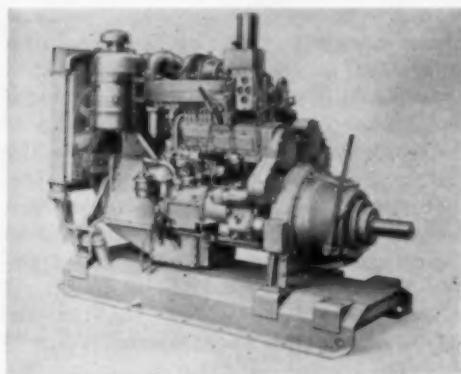
Early in automotive diesel development, the use of the governor as an intermediary control of running speed between the governor and the metering element of the injection system was adopted. By this means, a given accelerator position is made to produce a fixed engine speed, regardless of minor variations in load. Advantages of this arrangement are that the driver is relieved of the necessity of continually adjusting his foot pressure on the accelerator to maintain a constant speed and that the regulation of metering is less subject to violent fluctuations. Two refinements of this control have also appeared, namely Torque Control and Speed Droop. Torque control consists of a modulation of the metering limit stop. It arises from the fact that for a given smoke limit, maximum fuel delivery may be somewhat greater at slow speed, full load, than at high speed.

This, of course, is because the volumetric efficiency of the engine is somewhat higher at slow speed than at maximum and that means more air is available to burn more fuel. By permitting this small increase in maximum fuel delivery at the low end of the speed range, therefore, somewhat greater torque and accordingly horsepower output results. Lately the desirability of this action in automotive service has come into question, since it accentuates the already pronounced high torque at low speed, or lugging characteristic of the diesel, which has encouraged a tendency toward driving a willing horse to death. Indeed there has been some sentiment in favor of reversing the action, so that the limit is actually reduced at low speed instead of being increased. This would have no effect upon maximum output, but would make the engine a little more mulish under lugging conditions.

Part II in the November issue will feature Over-injection with Turbo, Speed Dip, Idling Speed, Safe Operating Range, Starting, and other functions of automotive diesel control.

Two New Cat Diesel Units

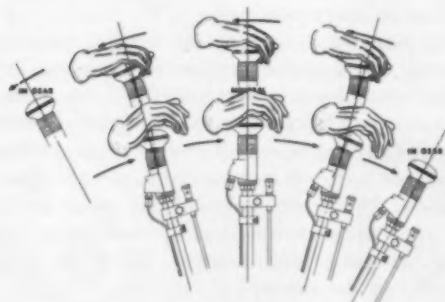
The Caterpillar D353 diesel engine, well-known as the power unit in the Caterpillar D9 Tractor, is now available in industrial engine, marine engine, and electric set arrangements, according to a recent announcement by Caterpillar Tractor Co. The 6-cylinder, four-cycle D353 has a 6¼ in. bore and 8 in. stroke, and is rated at 390 (max. output) hp at 1300 rpm. The rated output of the Cat D353 Electric Set is 200 kw. The introduction of this new engine, after more than two years of operation under all conditions in the D9, rounds out the company's line of heavy-duty diesel engines. Many of the features incorporated into the new engine are the same as those found in the other engines comprising the company's line. Important among them is the Caterpillar fuel system, whose versatility allows operation on a wide variety of fuels without fouling. It is designed to op-



Cat D353 diesel is a 6 cyl, four-cycle, 6¼ in. bore by 8 in. stroke diesel, rated 390 max. hp at 1300 rpm, and is turbocharged.

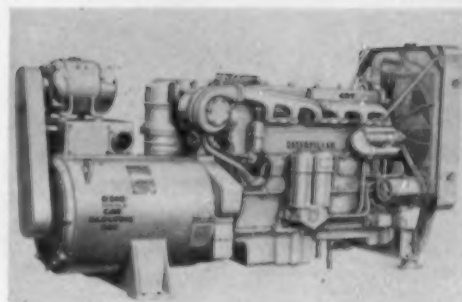
Automatic De-Clutching For Fuller Transmissions

Fuller Manufacturing Company, Transmission Division, Kalamazoo, Michigan, announces a new Air-Power De-Clutch for models R-46, R-96 and R-960 RoadRanger Transmissions. The new Air-Power De-Clutch system is used for releasing and engaging the clutch while the vehicle is in forward motion . . . without the use of a clutch pedal or the addition of any substitute action or motion on the part of the driver. Complete release and re-engagement of the clutch, as well as double clutching, is accomplished automatically at the appropriate time and in the normal course of moving the shift lever for gear engagement. Operating from the vehicle air system at full line pressure, the Power De-Clutch employs only a pilot valve, relay valve, and air cylinder connected by the required lines, hoses, fittings and clutch linkage. As the pilot valve, mounted at the top of the



crate equally well on No. 2 furnace oil or premium quality diesel fuels. In addition, the camshaft on the D353 Engine is mounted high in the block, permitting the use of a short, rigid valve train, which produces accurate valve motion. Hardened steel valve seat inserts and positive valve rotators contribute to long, efficient valve seat life. The turbocharging feature of the D353 utilizes waste energy from engine exhaust to pack more air into the cylinders. This results in the more complete combustion of fuel, and increased engine horsepower. Since the turbocharger does not produce a parasitic power load on the engine, but uses energy which would otherwise be lost, the over-all efficiency and economy of the engine is increased. Concurrent with the availability of the Cat D353, the company is also making available a full line of matched attachments. Such items as air, electric or gasoline starting systems; clutches; bases, controls and governors; cooling systems and mufflers have been specifically designed to match the new engine's performance in all applications.

The compact and durable Caterpillar D318 (Series G) diesel is now available as the power unit for both turbocharged and naturally aspirated electric sets, according to a current announcement by Caterpillar Tractor Co. The new Cat D318 (Series G) Electric Sets combine the recently-announced Series G equivalent of the Cat D318 Engine, with the space-saving and efficient self-regulated constant voltage Cat Generator, to produce a compact, dependable unit for generation. The turbocharged electric set arrangement is rated at 75 kw, and the naturally aspirated at 60 kw. Contributing to the reduced dimensions of the units is the generator design, which features a top-mounted ex-



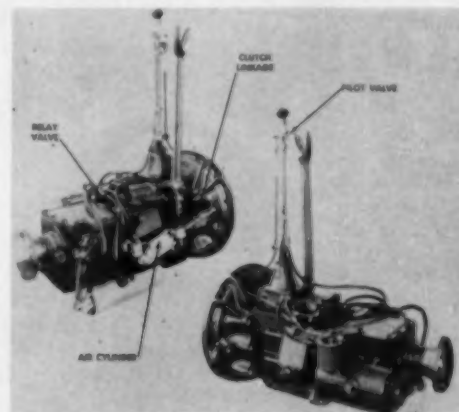
Cat D318 (Series G) electric set. This turbocharged model is rated 75 kw.

citer, and a single, heavy-duty bearing. A flex-plate coupling joining the generator to the engine fly-wheel eliminates a front bearing, in addition to simplifying alignment. On both electric set versions, the self-regulated, constant-voltage generator produces 60-cycle, three-phase current at an option of 120, 240, 120/208 or 480 volts at 1800 rpm. Since the regulator contains no moving parts, and no adjustments are necessary after initial setting, the unit is simple to operate and easy to maintain. Voltage is adjustable from 5 per cent above to 10 per cent below nominal voltage, and regulation can be controlled within 3½ per cent of rated voltage. When operated in parallel with other power sources, voltage droop is adjustable. Both models of the Cat D318 (Series G) electric set come complete with 24-volt electric starting, 18-ampere charging generator, and battery charging ammeter. They also are equipped with a vernier-type governor control, supports, flexible fuel lines and instrument panel with fuel pressure, oil pressure and water temperature gauges. The sets further include a water-cooled oil cooler and lifting eyes for easy handling.

gear shift lever, is actuated, air flows through it to open the relay valve. As the relay valve is opened, air flows to the cylinder which is linked to the clutch pedal shaft on the right-hand side of the transmission. Movement of the piston releases the clutch. When the pilot valve is closed, the cylinder is exhausted and the clutch is re-engaged. The pilot valve which incorporates the gear shift lever grip includes an actuator which is hinged against the spring tension—to permit opening of the valve by a slight movement either forward or backward. The spring tension maintains the actuator in a neutral or closed position.

When the driver applies pressure to the grip to move the lever to the next gear ratio, the normal resistance in the gear shift lever and shifting bar housing to such movement causes the actuator to move slightly forward or backward against the spring tension. With pilot and relay valves opened by this action, the air cylinder is energized and the clutch disengaged. As the shift lever reaches neutral, resistance to movement is momentarily diminished. This allows spring tension to return the actuator and pilot valve to the neutral or closed position. With this action, the cylinder is exhausted and the clutch is re-engaged. When resistance is again encountered as the lever moves from neutral on into the next gear ratio, the air cylinder is again energized and the clutch is again engaged—completing the double clutching procedure. Engine speed is adjusted to the new ratio to be engaged while the shift lever is in the neu-

tral position. The new Power De-Clutch may be employed in all shifting situations where the vehicle is in forward motion. It may also be used to release the clutch before starting the vehicle—but the clutch pedal must be used to engage the clutch as the vehicle is put in motion in either a forward or reverse direction. This feature of the system is



an advantage at stop streets and lights. The Power De-Clutch is available as factory equipment installed on models R-46, R-96 and R-960 Fuller RoadRanger Transmissions. The Air-Power De-Clutch may also be obtained in kit form for field installation on these RoadRanger Transmissions equipped with either conventional lever or remote control.



WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

A Two Litre Rover Diesel

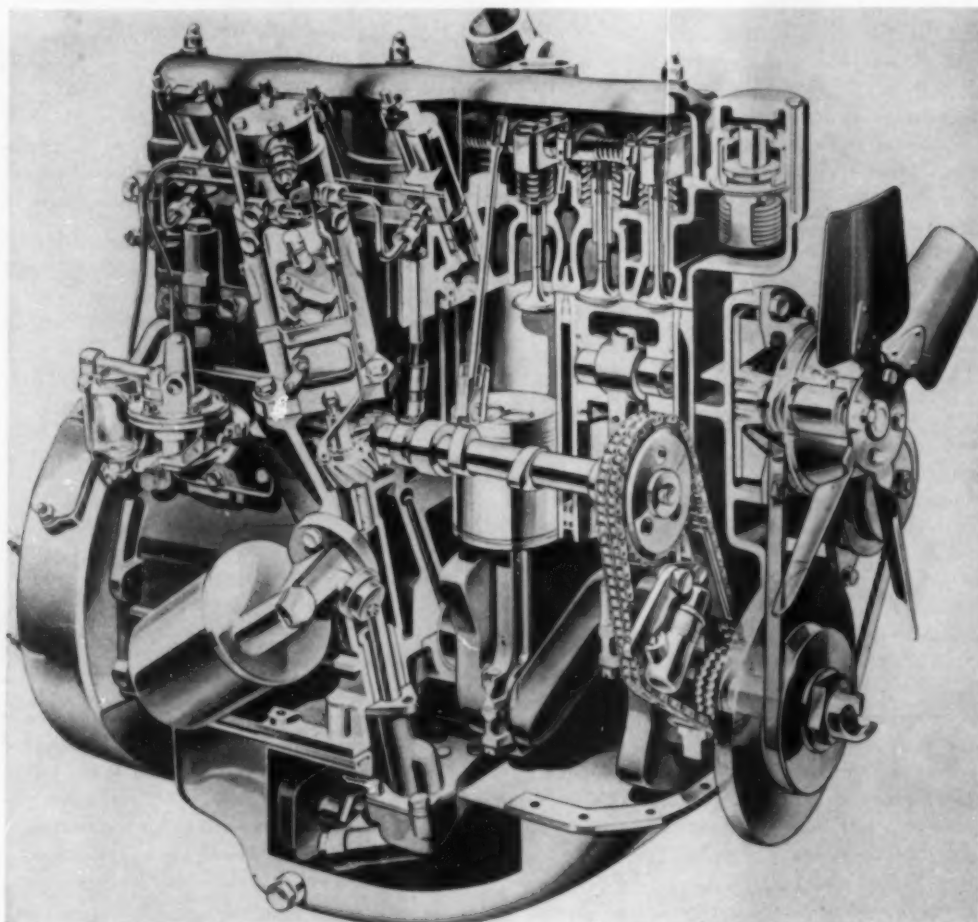
THE British-built Land-Rover vehicle closely resembles in appearance, the familiar war-time Jeep and hitherto, it has only been available with a gasoline power unit. The Rover company has now introduced a 52 bhp diesel alternative to give the Land-Rover a wider field of usage. The new diesel is a four-cylinder design with a speed range virtually the same as that of the patrol counterpart; i.e. up to 3,500 rpm. The cylinder dimensions are $3\frac{3}{4}$ in. bore by $3\frac{1}{2}$ in. stroke. The engine cylinder block is an iron casting and extends to below the crankshaft bearing center line to give greater rigidity. Care has been taken to ar-

range the disposition of the cylinder head holding down bolts to ensure an efficient seal between the block and head. The cooling water gallery is integral with the block and coolant is fed around the cylinders through the jets. The liners are the wet type.

The cylinder head is also in cast iron and incorporates a number of carefully proportioned water passages to direct a substantial flow of coolant around the points where it is most needed; namely, the injector housings and the valves. The latter are of the overhead type operated by push rods and rockers from a chain-driven camshaft.

The valves are of large diameter and rubber rings are fitted to their guides to maintain effective oil sealing. The forged steel crankshaft is counter-balanced and carried in three main bearings of the copper-lead type with tin overlay. Similar bearings are employed for the connecting rod large ends. The camshaft is in case-hardened steel and provides a high degree of valve lift. An interesting feature is the use of roller type tappets. The rollers follow the cam profile and run in lead-tin plated bronze shoes which in turn slide in a steel tappet guide. As mentioned previously the camshaft is chain driven from the crankshaft, the tension of the Duplex roller chain being maintained by means of an hydraulic tensioner fed with oil from the engine lubrication system. At engine idling speeds when oil pressure is low a ratchet device keeps the chain from slackening. A rubber damper is fitted on the front side of the chain to prevent whip.

Aluminum alloy pistons are used, each carrying three compression and two oil control rings. In the top of the pistons are the familiar recesses used in conjunction with the latest Ricardo Comet MK.V combustion chambers incorporated in the cylinder heads. With this combustion arrangement, fuel is sprayed into the hottest zone of the compressed air in the chamber when the engine is started from cold, and is directed tangentially in the direction of air swirl for normal running. The lower portion of the combustion chamber is a heat-resisting thimble in the form of a precision casting in Nimonic C.C., this being the cast version of the well-known Nickel-Chromium alloy Nimonic 80 developed initially for the moving blades of aircraft gas turbines. Fuel injection equipment on the engine includes the new C.A.V. type D.P.A. distributor pump with mechanical governor, the nozzles being of the Pintaux type with twin jets. Glow plugs are fitted as an additional aid to starting at low temperatures. Engine lubrication is by a submerged gear type pump driven from the camshaft. Oil at a pressure of 50 to 60 lb per sq in. is delivered to the main, big-end and camshaft bearings and to the tappet gallery. The engine cooling system makes use of a belt driven centrifugal pump mounted at the front of the engine. A bypass thermostat is included in the system.



National Forge Officers



Robert O. Wilder



John C. Harrington

The National Forge & Ordnance Company of Irvine, Pennsylvania, near Warren, has announced that John C. Harrington, former President of the Company, has been named Chairman of the Board of Directors. Robert O. Wilder, formerly Executive Vice President, has assumed the duties of President and Duane E. Wilder, Secretary-Treasurer of the Company, has assumed the additional duties of Vice President. Mr. Harrington has been employed by the National Forge for 41 years and has served as President for the last 17 years. He was the second President of the Company, having succeeded to that office on the death of Clinton E. Wilder in 1940. During his term as President the company's total employment has more than doubled to over 900 employees and the manufacturing facilities have increased proportionately. Mr. Harrington will remain active in the management of the Company in his new position.

Robert O. Wilder, son of C. E. Wilder, founder and first President, had been associated with the various operating divisions of the company prior to his appointment to the position of Executive Vice President in 1956. Duane E. Wilder, the new President's brother, has been associated with the Company as Secretary-Treasurer since 1952. The National Forge & Ordnance Company is a manufacturer of steel forgings such as diesel locomotive and compressor crankshafts, pipe molds, ship shafting and other industrial components. National Forge also operates a crankshaft rebuilding service. Its facilities consist of electric melting furnaces, forging shop, heat treating plant, surface hardening facilities and machine shops.

New Hercules President



William L. Pringle

Changes in the top management of the Hercules Motors Corporation, a manufacturer of gasoline and diesel engines, were announced recently following a meeting of directors. William L. Pringle, who has been serving as Director of Engineering with the Long Manufacturing

Division of Borg-Warner Corporation, Detroit, has been elected President to succeed John C. Keplinger who is retiring from the top executive post but will retain his position as a director and will continue as an executive consultant. Mr. Pringle, who was also elected a director, will assume his new duties October 1. Henry H. Timken, Jr., Chairman of the Board of Timken Roller Bearing Company was elected Chairman of the Board. He succeeds Charles Balough, one of the founders of the

company, who has been serving in that capacity and as a director since his retirement as President 4 years ago. Mr. Balough, who resigned as Board Chairman and a Director, will sever his connections with the company October 1. Placement of another top-flight industrialist on the board also was announced. He is Walter F. Rockwell of Detroit, for years head of the Timken-Detroit Axle Company until its merger with the Standard Steel Spring Company to form the Rockwell Spring and Axle Company.

In joining the board of directors of the Hercules Corporation Mr. Pringle and Mr. Rockwell take over places vacated by resignations of Mr. Balough and Raymond W. Loichot, president of the First

National Bank, Canton. Others on the board in addition to Mr. Pringle, Mr. Rockwell, Mr. Timken and Mr. Keplinger are John G. Ketterer, attorney and John D. Cook, both of Canton; George Gund, President of the Cleveland Trust Company and William C. Dunn, Chairman of the Board of the Ohio Crankshaft Company, both of Cleveland; and Henry T. Mather, President and Treasurer of the Mather Spring Company, Toledo, Ohio.

Officers include, in addition to Mr. Timken and Mr. Pringle, Walter L. Brough, Executive Vice-president; L. G. Downey, George W. La Salle and Arch R. Miller, Vice-presidents; Mr. Cook, Secretary and Treasurer and John M. Tondra, Assistant Secretary and Treasurer.



EATON VALVES

are Backed by 35 Years of Diesel Engine Experience

Eaton Diesel Engine Valves are produced to meet the exacting requirements of Diesel engine service. Through more than 35 years of co-operating with the country's leading Diesel engine manufacturers, and furnishing valves to them, Eaton has developed a thorough understanding of the problems peculiar to the Diesel field. Eaton's experience is reflected in the outstanding performance records achieved by Eaton-made valves in all phases of Diesel engine service.

Eaton Diesel Valves are produced in a wide range of materials, and in both faced and unfaced designs.

Our engineers will welcome the opportunity to discuss the application of Eaton valves to your engines.



EATON

VALVE DIVISION
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamic Drives, Brakes, Dynamometers

Northeast Diesel

Notes

By Arnold B. Newell

THE Elizabeth City Shipyard, Inc. of Elizabeth City, N. C. has been awarded a contract to build three all welded 72 ft torpedo retrievers for the Navy De-

partment. The diesel propulsion system comprises eight Detroit G-M engines arranged as quads to deliver 1300 hp for a speed of 18 knots.

L. G. DE FELICE & Son, Inc. of North Haven, Conn. has taken delivery of a P&H shovel Model 1055 powered by an 8-cylinder D375 Caterpillar diesel of 240 hp for general contracting work. It was

sold to Harold De Felice by J. H. Casey of Casey-Gesner Equipment Corp. of Hamden, Conn. on the floor at the Power Show and was the highest priced piece of equipment on display. It is the third purchase made by De Felice from Casey-Gesner in the past 12 months.

THE TUG *Dalzelle* under construction at the Jakobson Shipyard has been launched and is nearing completion. This is an 89 ft vessel powered by a 1600 hp General Motors diesel and gear drive for the Dalzelle Towing Co. of New York City.

THE St. Lawrence Seaway Development Corporation has placed a contract with the Christy Corp. of Sturgeon Bay, Wisconsin, to build a 103 ft diesel-electric tug of ice breaker type.

MORRIS Machine Works, Inc. of New York City, has purchased a Detroit G-M diesel, Model 12103 from Griffin Equipment Corp. of New York to repower a 10 in. dredge pump for use by the Middlesex Dock and Dredge Company of Perth Amboy, New Jersey.

GLADDING-Hearn Shipbuilding Corp. of Somerset, Mass. has obtained a contract to build a 50 ft heavy duty diesel tug for the Morania Oil Tanker Corp. of New York City. Further details will become available later.

TWO Fordson Major, diesel driven tractors, fully equipped for farm service have been sold by H. A. Stein Tractor & Equipment Co. of Bedford Hills, New York to H. A. Stingroves, a citrus fruit grower of Fort Pierce, Florida.

THE Inland Express Company of Syracuse, N. Y. operating highway freight service between Buffalo and Boston has ordered four more White tractors powered by Cummins diesels. This brings the diesel tractor fleet up to 28.

TWO 7-cu yd Model S-7, Euclids have just been sold by Standard Equipment Company of Kingston, Pa. to the Wyoming Valley Nursery of Wyoming, Pa. for general uses on their properties. The engines are General Motors Series 4-71 diesels rated 143 hp.

A MODEL 70 John Deere, 45 hp diesel tractor equipped with Hopto front end loader and backhoe has just been purchased by Gus Boniello, general contractor of Mahopac Falls, New York. The Colonial Supply Company's Brewster, N. Y. Branch made the sale.

THE Blount Seafood Corp. of Warren, R. I. has taken delivery of the 57 ft cruiser *Aphrodite* powered by twin General Motors diesels totaling 450 hp. The boat will be used for fisheries research

work, particularly in connection with development of Commercial tuna fishing along the North Atlantic Coast. The owner, F. Nelson Blount is the designer and Newbert & Wallace of Thomaston, Maine are the builders.

MACLEAN, Grove Brewster of Roscoe, New York has purchased a 200 kw diesel-electric generator set from Griffin Equipment Corp. of New York City. The unit has a General Motors Model 12103 diesel to be used for construction power.

WAGNER Crane Service of New York City has taken delivery of a 45 ton P&H truck crane with P&H diesels top and bottom. It is said to be the largest mobile truck unit available. Casey-Gesner of Hamden, Conn. sold it.

JOHN Rilling, general contractor, of Norwalk, Conn. has taken delivery of a new Fordson Major diesel tractor from H. A. Stein Tractor & Equipment Co. of Bedford Hills, New York. The tractor is equipped with a digger and loader.

THE third tug in the group of three building for the Dalzell Harbor Corp. has been launched and nearing completion by the RTC Shipbuilding Corporation of Camden, N. J. These are 95 ft boats powered by 1800 hp Fairbanks-Morse opposed-piston diesels for harbor use under charter to the New York, New Haven & Hartford Railroad.

THE Consolidated Edison Co. of New York has purchased from Griffin Equipment Corp. of New York City a G-M Detroit Diesel Engine Division diesel Model 6031C to drive a special generator at their Long Island City plant.

THE Hunkin-Konkey Construction Company has just purchased four Model 63TD, 15 cu yd Euclid Shovels from the Standard Equipment Co. of Kingston, Pa. The diesels are General Motors, 300 hp series 6-110.

R. J. GALLAGER of Danbury, Conn. who specializes in septic projects has purchased a diesel driven Fordson Major equipped with blade and backhoe. The H. A. Stein Tractor & Equipment Co. of Bedford Hills, New York, made the sale.

THE BRUNALLI Construction Company of Southington, Conn. recently bought a P&H Model 555 shovel from Casey-Gesner Equipment Corp. of Hamden, Conn. for use in construction work. The upper and lower diesels are P&H Model 487C-18.

THREE Euclid Model 1-UD units of 10 ton capacity each, powered by Gen-



We made a
"Good Neighbor"
out of the
**DUCOMMUN ST.
STATION**

When the Southern California Gas Company planned the Ducommun St., Compressor Station, they were concerned about a bad neighborhood relation situation, unless something was done about quieting the engine compressors.

Logically the problem of minimizing engine exhaust and air intake noise was turned over to the Burgess-Manning Company . . . specialists in noise elimination. After a thorough analysis of the situation they recommended, designed and built especially engineered Burgess-Manning "SDF" Air Intake Cleaner Silencers and Burgess-Manning "BEO" Exhaust Snubbers for each of the eight Ingersoll-Rand Gas Compressors.

In addition, special Burgess-Manning Pulsation Snubbers were installed in the second stage discharge of the compressors to eliminate gas pulsation in the discharge piping.

As a result, the Ducommun St. Plant is the quietest of its type anywhere, an asset to its community and a pleasure to work in. The elimination of pulsation will keep maintenance costs at a minimum.

Successful installations of this kind are possible because of the years of research, study and experiment in the cause and effect of noise that preceded them. Burgess-Manning Engineers are specialists in the elimination of exhaust and intake noise and the pipe line vibration that pyramids maintenance costs.

When such a problem arises in your plant or projected installations, consult Burgess-Manning for a superior, economical solution. They can engineer excessive noise and vibration right out of your equipment and make a "Good Neighbor" out of your plant too!

**Eliminate Intake and Exhaust Noise,
and Piping Pulsation Problems . . .
Consult Burgess-Manning Engineers**



BURGESS-MANNING COMPANY

747 East Park Ave., Libertyville, Illinois
Dallas, Texas

eral Motors 125 hp Series 4-71 diesels have been sold by Standard Equipment Co. of Kingston, Pa. to Alpha Portland Cement Co. of Easton, Pa. for use in their quarries.

Oil Testing Kit

The new Simplex Oil Testing Kit for diesels has recently been announced by the Lengor Co. This oil test kit was originally developed for the armed services, in order to give their non-technical personnel a tool that would quickly and accurately measure the amount of harmful contaminants in used engine oils. The kit, which measures only 6 x 6 x 13 in., contains the necessary equipment to measure the three most harmful contaminants in used engine oil, according to the manufacturer. These contaminants are solids, corrosive acids and fuel dilution. The equipment in the Simplex oil test kit is relatively unbreakable, can be easily cleaned without the use of solvents, does not require electricity, and is easy to operate. The results obtained from the kit are reproducible, and a complete test on the oil can be made in approximately five minutes.

The kit tells when lube oil is 5% diluted, which indicates a needed oil change, or if it is under 5% and still considered satisfactory for continued usage. There are no calculations to make and no tables to read. The kit also measures and indicates the acid condition of the oil, and whether the acid content is too high for continued usage of the oil. Finally, the kit also tells when the amount of solid contaminant in the used oil exceeds the amount the oil is capable of keeping in suspension, which causes deposit formation on various engine parts.

This testing kit is designed to give the engine operator a quick "go-or-no-go" test on the condition of the used lube oil in his engine. The simplicity of operation and the color charts and instructions provided, make the tests easy for anyone to perform, report Lengor engineers. For more information write the manufacturer, The Lengor Co., Towns-Worth Bldg., Annapolis, Maryland.

ITS NEW

Small, Versatile Truck

The Getman Scoot-Crete, a new truck for construction, mining and other industries, is now manufactured by Getman Brothers of South Haven, Michigan, and production schedule has been set up in such a way that deliveries can be made within a week to ten days, according to D. E. Getman, President of the Manufacturing Division, Getman Brothers, South Haven, Michigan. This little truck is not manufactured on the

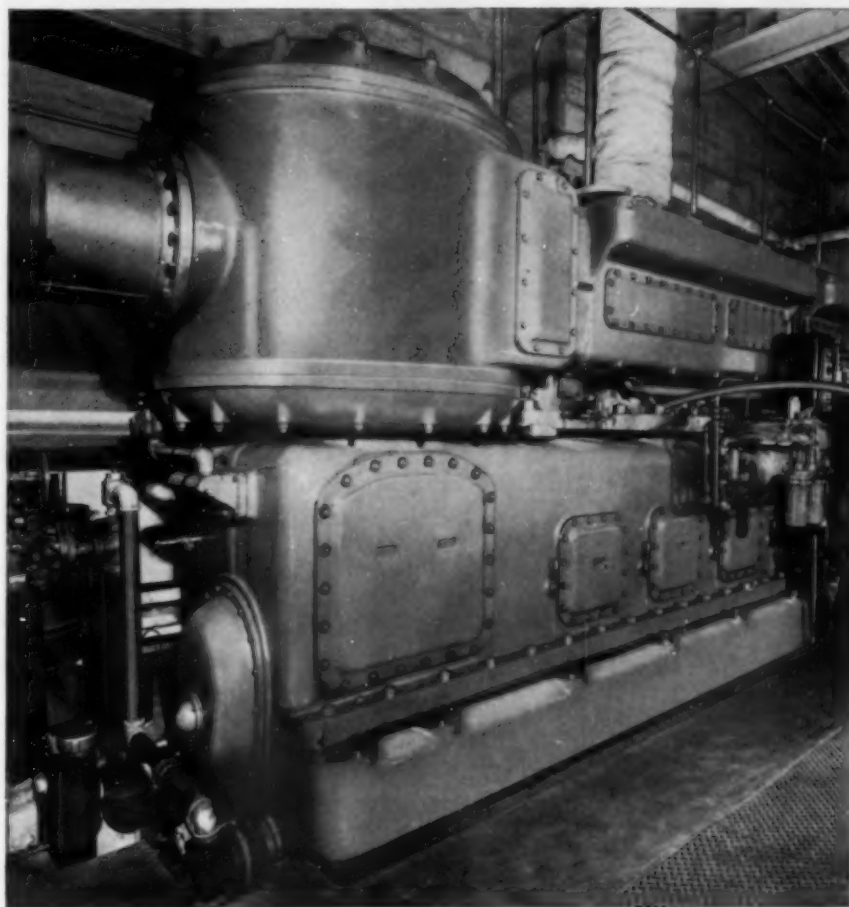
assembly line, but custom-made. Price range for the Getman Scoot-Crete is from \$865.00 to \$1,899.00. One man can load, drive and dump the Getman Scoot-Crete, carrying loads up to 3,500 lbs at speeds up to 15 mph. The Getman Scoot-Crete with caster steering turns in its own length for easy maneuverability. Heavy duty tires provide a sure grip on any surface indoors and

outdoors. With drive wheels located directly under the load, the Getman Scoot-Crete has the power to climb grades up to 25° for consistent performance under varied conditions. The locking brake lever holds the Getman Scoot-Crete positively immobile. Ruggedly built, with forward and reverse speeds, with Deutz air-cooled diesel engine imported from Kloeckner-Humboldt-Deutz AG. in Co-

logne, West Germany, it can be used inside, outside and underground. The Getman Scoot-Crete is an example of small business ingenuity. The Scoot-Crete is an invention of D. E. Getman and it is characteristic that people from places as far as Africa and India come to South Haven, Michigan in order to see the Getman Scoot-Crete.

ITS NEW

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Stop the formation of harmful varnish, sludge and carbon in your Diesels and *keep it stopped* with Sinclair RUBILENE® or RUBILENE HD, the high viscosity index oils proved by over 35 years in industrial Diesel applications. RUBILENE earns its reputation by its performance under continuous operation and heavy loads. It fights deposits and gives better protection to cylinders, pistons, rings and other vital moving parts. Your Diesel stays on the job longer . . . service time is cut 'way 'way down.

Let RUBILENE help solve *your* lubrication problems. Regardless of the make of your Diesel, there's a member of Sinclair's RUBILENE or RUBILENE HD family that meets your requirements. Call your local Sinclair Representative for further information, or write for free literature to: Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation!*

Dino, the Sinclair Dinosaur, says:

"Send now for
free literature on
RUBILENE!"



SINCLAIR RUBILENE® OILS

Michigan-Ohio News

By Jim Brown

IN ORDER to provide more power for the towboat *Union*, owned by Valley Camp Coal Company of Elm Grove, W. Va., Ray C. Call, Inc. of Steubenville, Ohio has installed a GM Detroit Diesel model 6-110 marine engine. The new

6-110 replaced a model 6-71 GM Detroit Diesel which had been in service for 10 years.

GREAT Lakes Steel Corporation of Ecorse, Mich. has purchased two Allis Chalmers model HD6G tractors equipped with Tractomotive model TS6 front-end loaders. The sale was made by Earle Equipment Company of Detroit.

THE FLINT Recreation and Park Board of Flint, Michigan has recently purchased a model TD-6 International crawler tractor from Wolverine Tractor and Equipment Company of Detroit and Grand Rapids.

CUMMINS Diesel Michigan, Inc. has recently installed a model HRMS-600 Cummins diesel in a new 40 ft tugboat,

the *John Bryce*, presently located at Sault Ste. Marie, Mich. She will be broken in as a personnel and light work boat by her owner and builder, Mr. Bryce Smith of River Rouge, Mich. on the Connecting Channels project. Reverse Gears are Twin Disc with a ratio of 3 to 1.

THREE new Ingersoll-Rand model DR-900 air compressors powered by GM 6-110 Detroit Diesel engines will also be used on the Connecting Channels project at Sault Ste. Marie by Dunbar & Sullivan Co. of Detroit. The air compressors were supplied for a drilling and blasting barge by the R. G. Moeller Co. of Detroit.

A CATERPILLAR model D9 crawler tractor equipped with cable bulldozer was sold by Michigan Tractor and Machinery Company to Lewis & Frisinger Co. of Grand Rapids, Mich. The new Cat crawler will be broken in on a highway project near Grand Rapids.

A 2 CU YD model 125A Michigan tractor shovel powered by a 105 hp GM Detroit Diesel model 3-71 engine has been delivered by Lake Shore, Inc. of Iron Mountain, Mich. to Mr. Joe Hamel of Marquette, Michigan.

A FULLY-equipped Allis Chalmers model 45 Motor Grader has been delivered to Mr. S. N. Cunningham of South Lyons, Mich. by Earle Equipment Co. of Detroit.

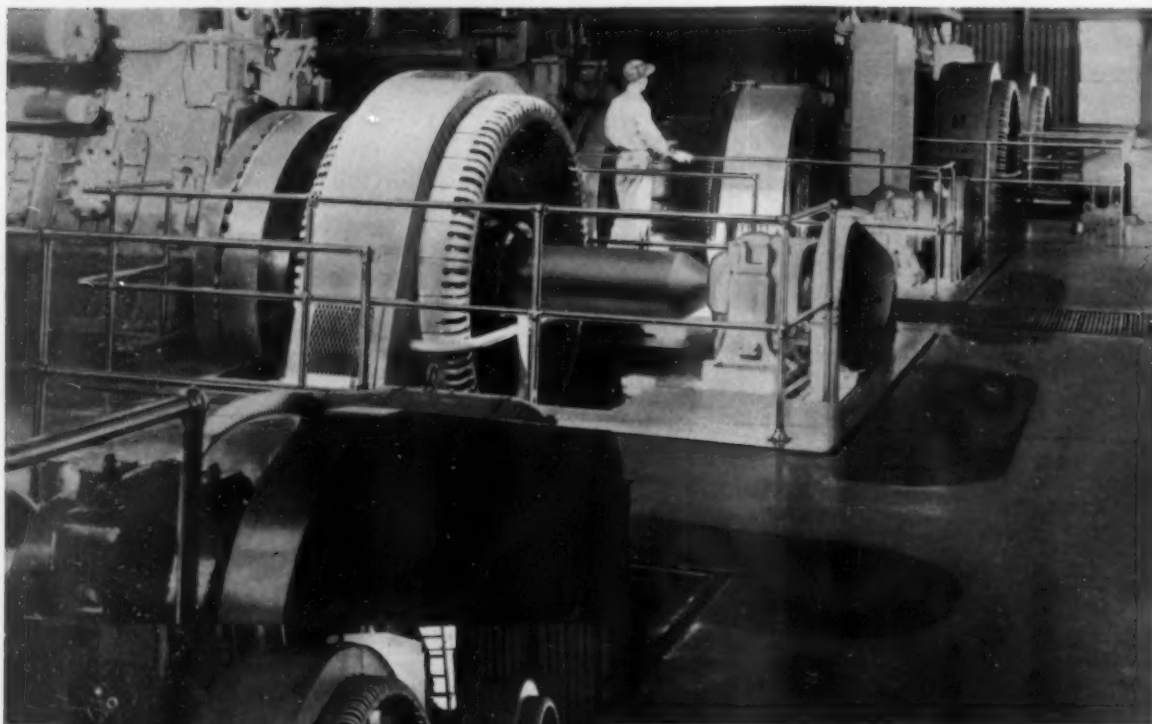
THE FORD Motor Company of Dearborn, Mich. has purchased a model HAD Hough Payloader for use in their steel mills. The sale was made by Wolverine Tractor and Equipment Co. of Detroit.

TWO MODEL C Tournapulls powered by GM 6-71 Detroit Diesels have been sold by Telford Equipment of Detroit to McQuestion & Kauthen of Dearborn, Mich. The new LeTourneau-Westinghouse Tournapulls will be broken in on a state highway project near Rockford, Michigan.

DENTON Construction Company of Grosse Pointe, Mich. has a new Link-Belt Speeder model K 365 crane with a clamshell bucket. Powered by a Caterpillar model D342 diesel engine, the crane was purchased from Michigan Tractor and Machinery Co. and will be broken in stockpiling materials for cement mixing on a highway project (US-23) near Flint, Michigan.

OHIO River Collieries Company of Cheshire, Ohio has a new GM model 4030-C Detroit Diesel engine for auxiliary power for their model 7400 Marion power shovel. The engine was purchased

efficient and economical power . . . with ELLIOTT engine-driven generators



Five Elliott synchronous generators (exciter of unit in foreground is visible) deliver 9220 kw for the Pittsfield plant of Illinois Rural Electric Company. Note how the stator in the second unit from the left is shifted for routine inspection.

Wherever ELLIOTT generators are in service, they demonstrate superior performance as well as worthwhile economies both initially and in annual operating costs. At the Pittsfield plant of the Illinois Rural Electric Company, illustrated on this page, three Elliott 1450-kva, 360-rpm generators were installed in 1950. Two Elliott 3750-kva units were installed more recently. In addition, five Elliott generators also serve the company's Winchester plant. Here are some of the features which have resulted in the popularity of Elliott engine-driven generators:

- Designed for trouble-free operation
- Custom-built for specific requirements
- All-modern, Fabri-steel construction
- All-welded steel stator frame for high strength
- All-welded rotor withstands torsional vibration
- Accessible for routine cleaning

Write for Bulletin PB 1400-3

ELLIOTT Company



Ridgway Division Ridgway, Pa.

Closeup of the two new 3000-kw, 4160/2400-volt Elliott synchronous generators driven by dual-fuel engines.

The Pittsfield plant of the Illinois Rural Electric Company. Elliott motors drive the centrifugal scavenging compressors in this plant.



from Ray C. Call, Inc. of Steubenville, Ohio.

WOHLIN Construction Company of Wyandotte, Mich. has accepted delivery on an Allis Chalmers model HD6G tractor equipped with a Tractomotive model TS6 front-end loader and TR6 ripper. The sale was made by Earle Equipment Co. of Detroit.

WOLVERINE Tractor and Equipment Company of Detroit has recently delivered an International model TD-24 crawler tractor equipped with a model 24D-2 hydraulic bulldozer blade to Mr. William J. Muchlenbeck of Saginaw, Michigan.

W. C. BYE Excavating Co. of Flint, Mich. has purchased a model HRFBI-600 Cummins for installation in a Woolbridge Scraper from Cummins Diesel Michigan, Inc.

CARL Goodwin & Sons of Allegan, Mich. are breaking in a new Caterpillar model D9 crawler in Portland, Mich. The Caterpillar crawler was delivered by Michigan Tractor and Machinery Co.

A 1-YD LINK-Belt model LS-98 Magnet Crane powered by a GM model 4030-C Detroit Diesel engine has recently been delivered by Flack Equipment Co. of Dayton, Ohio to Mose Cohen & Sons of Cincinnati, Ohio.

SMITH Brothers Excavating Co., Inc. of Cassapolis, Mich. has recently accepted delivery on an Allis Chalmers model HD21 crawler tractor equipped with torque converter and hydraulic bulldozer blade. The sale was made by Earle Equipment Co. of Detroit.

WOLVERINE Tractor and Equipment Company of Detroit has sold an International model TD-9 crawler tractor equipped with a Drott Skid shovel to John F. Gohl of Detroit.

R. G. MOELLER Co. of Detroit has delivered a model 99L Austin-Western Grader powered by a model 4-71 GM Detroit Diesel to the City of Mt. Clemens, Mich.

A 1 3/4 YD LINK-Belt Speeder dragline (model K 365) powered by a Caterpillar D342 engine was recently delivered to S. D. Soloman & Sons of Pontiac, Mich. by Michigan Tractor & Machinery Co.

St. Louis District Manager

New assignments in the Sales Department of the Engine Division of Nordberg Manufacturing Company are announced by R. W. Bayerlein, Division Vice President. Mr. Richard C. Gamble is appointed District Manager of the

St. Louis territory, which includes eastern Missouri, southern Iowa, and the State of Illinois. He will also follow marine engine sales along the inland waterways in the greater St. Louis area. Gamble succeeds R. P. McBride who returns to the main offices in Milwaukee. Mr. Gamble joined Nordberg in 1948 and has been a sales engineer in their Dallas, Texas territory for the past three

years. Previously, he was a Sales and Service Engineer, serving distributors of Nordberg Power Chief engines and was assigned to the company's Export Sales Department. Gamble is a native of Milwaukee and attended both Marquette University and the University of Wisconsin. He was a U. S. Air Force fighter pilot in the European theatre during World War II.

NOW AVAILABLE! The Brand New **DIESEL ENGINE CATALOG**, Volume 22. This giant, 400 page, 10 1/2" x 13 1/2", fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL PROGRESS**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

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Tested WIX Filtrants keep oil cleaner for longer periods. WIX Engineered Cartridge construc-

tion assures precise fit and ease of installation. Extensive laboratory facilities, constant field testing and accumulated know-how of many years' experience are your guarantee of the utmost in efficient, economical filtration.

Let WIX Engineering solve your Diesel filtration problems! Write today for the complete WIX Catalog of Filter Cartridges for Fuel or Lubricating Oils...or for the assistance of WIX Filtration Engineers.



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Mid-West Diesel News

By L. H. Houck

JEFFERSON City Diesel Sales & Service Co., opened in August in Jefferson City, Mo., at 713 Dix Road and Highway 50 West. Owner is Alex J. Gates. The new firm features GM diesel sales and a 24-hr service department. Paul Edwards is

service manager, Bob Jones, parts manager and Lowell Nolte, structural repair. They are equipped to do all kinds of repair work in shop or field.

FRISCO Railway Co., St. Louis, took delivery on 8 diesel locomotives this spring. The 1750 hp GM units cost \$181,281 each or almost 1½ millions for the additional 14,000 hp, according

to A. N. Laret, vice-president in charge of purchases and stores.

POWELL BROS. Truck Lines, Springfield, Mo., has purchased 20 new units which include a number of International diesel tractors for over-the-road service.

INLAND MOTOR Freight, and its subsidiary, has placed 28 diesel-powered International tilt-cab trucks in service to haul 25-ft doubles which gives them 25 per cent more load space as compared with 3-axle truck and trailer combos.

BOWEN & PARSONS, Williamsburg, Mo., have added an Allis-Chalmers 45 motor grader with Buda diesel and an HD-16 with the same type of power, for use in their highway contracting business. Sale was made by Cooke Sales & Service, Fulton, Mo.

CARDINAL Drilling Co., Bismarck, N. D., has installed a GM Series 71 diesel, 281 hp as a replacement engine. Engine was sold by General Diesel & Equipment Co., Williston, N. D.

RYAN Equipment Co., St. Louis, has delivered an Allis-Chalmers HD-16 with Buda Div. diesel, to Jack Bowie, Gobler, Mo., for use in dozing work.

MIDLAND Tractor Co., Chillicothe, Caterpillar dealers, delivered a D7 to Glenn Washburn, Princeton, Mo., and a D8 with torque converter (Twin Disc) to Ideker Const. Co., Mound City, Mo.

DOUBLE payload is hauled by an Autocar 10-wheel diesel at Warner Co.'s Cedar Hollow Quarry near Phoebeville, Pa., by adding a 17-ton trailer to the diesel's 17-ton side-dump body. Unit makes the 4 per cent grade with ease. Power is Cummins.

M.H.F. WORK Bull Model 404, ¾-yd loader on rubber, made by this division of Massey-Harris-Ferguson, is available with 52 hp diesel engine. This is the biggest tractor in this new line and it features a back hoe which handles 12 to 36-in. buckets and digs to a depth of 12½ ft, as well as loader with hydraulic controls.

TWO diesel-powered torque converter units are attracting attention in erecting steel at Alcoa's Warrick Works, near Evansville, Ind. John F. Beasley Construction Co., Chicago, is erecting steel 16 stories high with an American Model 140 crane with Cummins diesel and a Twin Disc 3-stage torque converter and a Manitowoc 3500 erecting crane with a Caterpillar D17000 diesel and Twin Disc 3-stage torque converter. Operators like this torque converter setup for

placing steel—some of the pieces weigh 17 tons.

PETTIBONE Speedall, Model 250 tractor shovel, ¾ cu yd capacity, a comparative newcomer in the heavy construction field, is powered with a P & H industrial diesel, 3 cyl Model 387C-18.

LEON SUMLER, Jackson, Tenn., contractor who does a lot of remodeling jobs, has placed an International TD-9 diesel with the Four-in-One skid-shovel, and has found it ideal for removing old concrete paving and foundations because of its unique pry action.

DIESEL Equipment Co., Inc., Wichita and Great Bend, Kan., has delivered a GM diesel to Honaker-Davis Drilling Co., Great Bend, for installation in a drilling rig.

W. E. GRAHAM & Sons, Cleveland, N. C., have added a number of Fordson Major diesels to its huge fleet for economical use on sheepfoot compactors, rollers, asphalt mixers and similar equipment. Ford Major diesel is a 4-wheel tractor on rubber.

L. E. SCHOOLEY, Grand Junction, Colo., is using Autocar tractors with Cummins NHS diesels and Spicer transmissions, in his uranium and vanadium ore hauling business. Body is an 8 cu yd rear dump and each truck pulls a 10 cu yd 4-wheel trailer. Truck uses Spicer 8055 transmission, 8035G auxiliary transmission and SQDD rear axle. Autocar truck is model DC-10264L with 235-in. wheelbase.

JOHN DEERE industrial units with diesels are now working in many parts of the country. Guy Brown, Genevieve, Neb., has one of the new 67 hp No. 820 John Deere diesels which he uses to pull a Hancock 8-yd scraper, moving 100 cu yds per hr. Lawrence Kirchoff, Byron, Neb., uses one on his farm. The rubber-tired unit features an independent PTO.

MERCEDES-BENZ diesels, now a part of the Studebaker-Packard setup, are now being offered as replacement engines for all types of trucks, boats, heavy construction equipment. Studebaker-Packard dealers will stock parts and furnish engines and service. Hp ranges from 15 to 3000.

New River Terminal

River traffic men report that Gulf Oil Corporation's new Mound City, Illinois river terminal with its modern midstream fueling facilities save a 20-barge tow eight hours refueling time. Average midstream refueling time is one hour compared to the approximately nine hours required when a tow has to be

Standard **Young** Units solve SPECIAL cooling problems

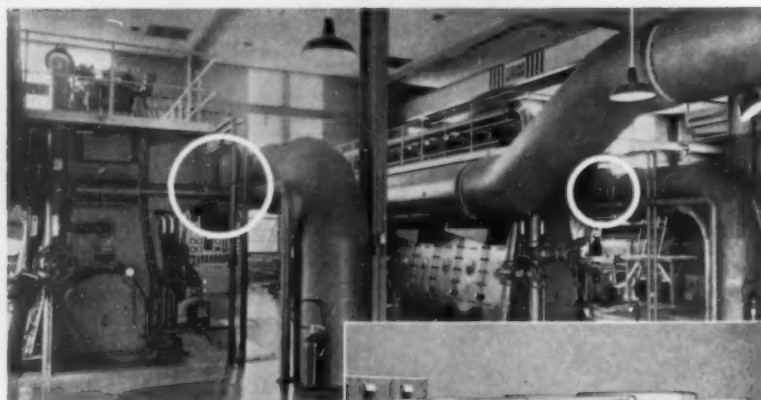


Photo shows the two Nordberg engines and Young intercoolers which are located between the scavenging air piping and the scavenging air header on the right side of each engine.

Exterior view of the rear portion of installation, showing the Young V.S.F. Units.

Young Intercoolers and VSF Units combine to provide flexible cooling

Limited water resources influenced the choice of coolers for these two 3870 hp Nordberg engines. Young Intercoolers reduce air temperature at engine intake air header, increasing efficiency in hot weather.

Two Young VSF Units arranged in parallel provide for optional use. Each has two 2-speed motor-driven fans. Vertical rolling doors control atmospheric cooling. Automatic control bypasses water around coolers to maintain desired jacket temperatures. All fans are controlled from panels alongside each Nordberg engine.

A special problem doesn't necessarily require special equipment; see Young about it first.

Write today to Dept. 407-K for catalogs 1652 and 550.



Young

Creative

RADIATOR COMPANY

RACINE, WISCONSIN

HEAT TRANSFER ENGINEERS

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

broken up and tied to shore. Prompt handling of the midstream refueling operation is effected through a radio-telephone service which relays arrival time of tows to the terminal. The tow-boat *M. V. Midstreamer*—call letters WE-7191—and its accompanying 1,000-barrel barge are then readied for action. The new terminal is ideally located on the Ohio River just six miles above its junction with the Mississippi. Thus, boat traffic on seven major rivers—the Mississippi, Missouri, Ohio, Tennessee, Illinois, Cumberland and Kanawha—will benefit from this inland waterway fueling service.

Terminal facilities, at Mound City, which operate on a round-the-clock schedule, include two 5,500-barrel storage tanks, ample fleet facilities for dock-side refueling, full accommodations for crew members including transportation to and from vessels, a shop for minor repairs, fresh, potable water, and the terminal serves as a mail port. A complete line of Gulf diesel fuels and lubricants is also available. The terminal is operated by the Marine Supply Company, now a Gulf Distributor. The distributorship is headed by Charles Fernald, president of Lea River and Indian River Lines. Mr. Fernald also occupies a top management position with a number of other inland waterway interests. Nearly 12-million tons of materials pass through the Mound City port each year and its importance is expected to increase considerably when the St. Lawrence Seaway traffic begins moving through in 1959.

Forms U.S. Subsidiary

In order to provide adequately for the handling of its growing business interests in the United States of America, D. Napier and Son Ltd., of Acton, London, has formed a new company, Napier Engines Incorporated, with headquarters in Washington, D.C. Napier's interests in the United States have hitherto been in the hands of technical representatives. The President is Mr. H. Sammons, C.B.E., M.I.Mech.E., F.R.Ae.S., managing director of D. Napier and Son. The Executive Vice-President is Mr. J. C. K. Shipp, who has long been resident in the United States representing the aviation interests of the English Electric Group, of which Napier is a member.

Mr. L. O. Brooks and Mr. A. Gualtieri, formerly Napier's representatives in the United States, are Executives of the new Company, the former to look after matters relating to the Napier Deltic diesel engine and Napier turbo-blowers, and the latter those relating to Napier's aviation interests. The principle objects of the company are to sell Napier's products; to make contracts with customers

for the overhaul of Napier engines; to sub-contract the overhaul and servicing of Napier engines, and to provide and distribute spare parts.

Vice-President Sales

The appointment of Lloyd E. Berry as vice president in charge of sales for American MARC Inc., California de-

signers and manufacturers of diesel engines and generators, was announced recently by W. Denis Kendall, president. Before joining the company's headquarters in Inglewood, Berry was distributor of the company's line in the South and Southeastern states officing in Houston, Texas. In sales and distribution since 1920, Berry was sales vice president for National Automotive Parts

Corporation's diesel distribution and previously distributor for Black-Decker, tool manufacturers. "We will intensify our nation-wide distribution of American MARC products through established diesel dealerships," Mr. Berry said. "Overall planning calls for the establishment of 6 regional sales divisions and 5 parts warehouses to provide efficient distribution throughout the U.S."

WINSLOW Full-Flow FILTERS

Case History Report No. 35 Shows Why Engines
Protected By WINSLOW FILTERS Last Longer



**MORE THAN 15,000
HOURS WITHOUT ENGINE
REPAIR**

Fuel Filtration

Central Texas Gravel Company further protects its powered equipment by Winslow Fuel Filters, which remove moisture, acid, dirt and other impurities from fuel oil, to protect working parts and improve engine performance.

Only Winslow Filters offer CP* Protection

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material.

These two Euclids were put into service by Central Texas Gravel Company in April, 1950. Winslow full-flow filters were installed to replace the original equipment; after which, oil was changed every 120 hours, and elements every 180 hours, instead of at 60 hour intervals. Both Euclids have GMC diesel engines.

No engine repairs whatever were required until June, 1956. In a six-year period, the engines were operated more than 15,000 hours under severe weather and dirt conditions. In 1956, one engine was replaced and the other is still in operation, without overhaul.

Contrast this record of engine performance and life with that of your equipment. This is only one example of the important savings made by the use of Winslow Full-flow Filters. You can increase engine life and reduce maintenance costs with Winslow Filters—because they keep all the dirt, moisture and other contaminants out of your engines, under any conditions. Only Winslow CP* filters can give you this protection. Let us send you information on filters and elements for your equipment.

CP* is fully protected by patents and trademarks

WINSLOW

ENGINEERING & MANUFACTURING COMPANY

4069 Hollis Street, Oakland, California

W-2394-A

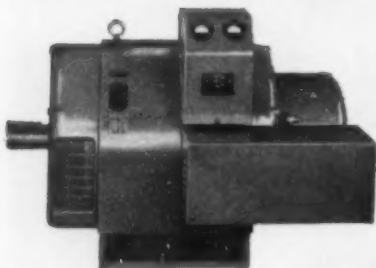
Mid-Continent

Diesel News

By Jack F. Cozier

O. R. BURDEN Construction Co., Tulsa, Okla., has taken delivery on a pipe line test unit designed and built by the Diesel Power Co., Tulsa. The unit is

Get the latest! A COMPLETELY NEW "PACKAGED" GENERATOR AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62½ thru 187 kva at 1200 rpm. Three phase, 90% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

No exciter... No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M-developed sensing circuit and "magical" magnetic amplifiers.

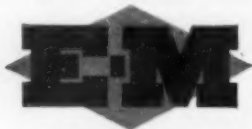
Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides ±2% regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

Simple to operate. Has no belts, no "tricky" commutator, no adjustments—anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.



ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

Largest manufacturer of "Packaged" Generators

2100-TPA-2154

powered by a GM model 6030C diesel engine driving a six inch four stage Gould pump that can be clutched into a Triplex pump to build up test pressure.

JOHN I. HAY Company, Chicago, Ill., bought two Fairbanks, Morse 10 cylinder, model 38D8½, 1600 hp each marine engines.

WEBSTER Steel Erectors, Oklahoma City, Okla., purchased a Lima 24-T truck crane powered by a GM series 371 diesel engine from R. A. Young & Son, Inc., Tulsa, Okla. The unit will be used for steel erection work at Oklahoma State University, Stillwater, Okla.

KERMAC Nuclear Fuels Corp., Grants, New Mexico, took delivery on three D-397 Caterpillar 350 kw electric sets complete with switchgear and distribution system from Hoover Equipment Co., Oklahoma City, Okla.

OKLAHOMA State Highway Department, Duncan, Okla., bought a Unit 1520T crane equipped with a crane boom for road maintenance work. The unit powered by a GM diesel engine was purchased from Midwestern Engine & Equipment Co., Tulsa, Okla.

J. B. HUDSON Construction Co., Bartlesville, Okla., has purchased a Shield Bantam back hoe powered by an Allis-Chalmers diesel engine. This sewer and water line contractor purchased this equipment from R. A. Young & Son, Inc., Tulsa, Okla.

VILLAGE of Hawley, Minnesota, has bought a Fairbanks, Morse six cylinder, 960 hp model 38D8½ diesel generating set.

KERR-MCGEE Oil Industries, Inc., Oklahoma City, Okla., took delivery on a Marion 362 crane equipped with a 100 ft boom and a 30 ft gib for work at their construction job at Grants, New Mexico. The unit powered by a GM series 671 diesel engine was sold by Midwestern Engine & Equipment Co., Tulsa, Okla.

KAY COUNTY, Newkirk, Okla., purchased an Allis-Chalmers #45 motor grader powered by an Allis-Chalmers diesel engine from the Boardman Co., Tulsa, Okla. The grader will be used for county road maintenance.

BREWSTER-Bartle Offshore Co., Houston, Tex., took delivery on two 350 kw Caterpillar D-397 electric sets with Switchgear and distribution system from Hoover Equipment Co., Oklahoma City, Okla.

CURTIS Corp., Tulsa, Okla., has repowered a Foote paver with a GM series

471 diesel engine from Diesel Power Co., Tulsa, for use in general contracting work.

CITY OF Clay Center, Kansas, has purchased a Fairbanks, Morse eight cylinder, 1280 hp model 38DD8½ basic dual fuel diesel engine.

S. R. SMITH Construction Co., Tulsa, Okla., has bought a Unit 1020A crawler crane from Midwestern Engine & Equipment Co., Tulsa. The unit is powered with a GM diesel engine and will be used as a lifting crane.

KAY COUNTY, Blackwell, Okla., purchased an Allis-Chalmers TL-20D tractors front end loader from the Boardman Co., Tulsa, Okla. The unit uses an Allis-Chalmers diesel engine and will be operated in a gravel quarry.

CURT BROWN Drilling Co., Pawhuska, Okla., repowered a mud pump with a GM model 12103 diesel engine from

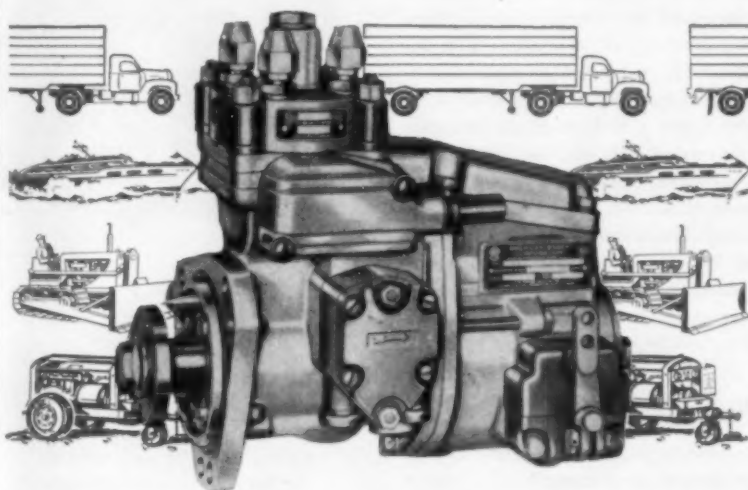
Diesel Power Co., Tulsa, Okla., for use on a drilling rig.

HASKELL Lemon Construction Co., Oklahoma City, Okla., purchased a Caterpillar D-337F 150 kw electric set and a Caterpillar D-311 20 kw electric set for powering a Universal asphalt plant. The engines were sold by Hoover Equipment Co., Oklahoma City.

WESTERN Industries, Inc., Tulsa, Okla., bought a Unit 1020A crawler crane with a back hoe attachment from Midwestern Engine & Equipment Co., Tulsa. The machine will be put into pipe line construction work and utilizes the power of a GM diesel engine.

JOHN I. HAY Company, Chicago, Illinois, received two four cylinder, model 38D8½, 640 hp each direct reversing marine engines from Fairbanks, Morse & Co.

KERR-MCGEE Oil Industries, Inc.,



Key to top performance... the PSB fuel injection pump

The PSB Fuel Injection Pump has established an unmatched record for dependable and economical diesel engine performance.

Proven design—here's a fuel injection pump with fewer parts and simple construction, employing positive governor control and a replaceable hydraulic head for fast field servicing.

Outstanding operating economy—from precise fuel metering and accurate distribution... the PSB Fuel Injection Pump's efficient design and careful manufacture assure long, trouble-free operation with minimum maintenance.

Backed by low-cost repair service—from "original-maker" repair by factory-trained experts at Authorized American Bosch Service Stations... nearly 200 in North America, Hawaii, and Puerto Rico... all equipped with special tools and test equipment, and stocked with genuine American Bosch replacement parts.



AMERICAN BOSCH
DIVISION
AMERICAN BOSCH ARMA
CORPORATION
SPRINGFIELD 7, MASS.

5277

Oklahoma City, Okla., has purchased a Unit 1020A crawler crane powered by a GM diesel engine. The unit is being used on a construction job at Grants, New Mexico.

DRESSER Engineering Co., Tulsa, Okla., bought a Lima 24-T truck crane powered by a GM series 371 diesel engine. The unit was purchased from R. A. Young & Son, Inc., Tulsa, and will be used on construction of the pump station for Northern Natural Gas Co. at Booker, Tex.

Assistant General Manager

Charles L. Ward, an engineer with extensive experience in the field of diesel engines who has been associated with Stewart & Stevenson since 1944, has been named Assistant to the General Manager for Stewart & Stevenson with headquarters in Houston. His most recent assignment with the company was in Dallas where he was Executive Engineer. In that capacity, he managed the Government Contracts Division.

Mr. Ward, a native of Kentucky, received his Mechanical Engineering degree from the University of Kentucky. He was associated with the Worthington Corporation prior to World War II and during the war was with the War Production Board, being in charge of diesel engine production. Mr. Ward held this post three and a half years, relinquishing it to join Stewart & Stevenson. Mr. Ward is a member of the Petroleum Engineers Club of Dallas, NOMADS, Dallas Athletic Club, American Ordnance Association and University Club in Washington. He is a Registered Professional Engineer in the state of Texas. Mr. and Mrs. Ward have two daughters, ages 7 and 11.

New Portable Dredge

Portability has been combined with high performance characteristics in a new low cost 8 in. dredge (Series 130H) designed by Ellicott Machine Corp., it was announced recently. Part of the Ellicott line of hydraulically operated *Dragon* model dredges, the new unit has a rated output of up to 85 cubic yards per hour. A spokesman for the firm reported that 45-50 day delivery can be made on this dredge and that it is priced under \$40,000, F.O.B. Baltimore. Heart of the dredge is an Ellicott 8 in. heavy duty centrifugal suction pump powered by a 6-cylinder diesel engine having a continuous rating of 142 shp. This main diesel engine also powers the hydraulic pump for supplying power to the cutter and winch motors, thereby eliminating the expense and additional weight of an auxiliary power supply. The new dredge can be used for all types of gen-

eral dredging work including mosquito control, land reclamation and the pumping of fill for real estate development and road building purposes. It will pump mud, silt, sand and other light sedimentary materials from a maximum digging depth of 17 ft below the surface of a body of water.

Of welded steel construction, the hull

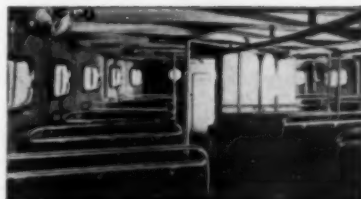
consists of two tank type pontoons, the assembled size being 32 ft long by 14 ft wide by 4 ft deep. The dredging machinery is mounted on the main pontoon and can be handled as a single unit. The removable side hull pontoon tank is attached to the main tank for trim and stability. Ellicott's new portable 8 in. dredge is engineered to transport water-bound solids through pipe

lines of 500 to 1500 ft. Rated capacity of 85 cubic yards per hour is figured on the basis of pumping through 1000 ft of 8 in. discharge pipe line with a terminal elevation of 5 ft above the surface of the water. For additional information on the new low cost, portable dredge, write to Ellicott Machine Corp., 1611 Bush Street, Baltimore, Maryland.

ITS NEW



NAPIER PACKS CRACK LINER SPEEDS INTO 70 FT. CREW BOATS!



3 visible reasons why Napiers were chosen

1 INCREASED PAYLOAD. The most powerful engine for its size and weight in the world, the Deltic takes up less space than engines of comparable horse power. In this case room was made for seating 50 passengers.

2 EASE OF MAINTENANCE. The Deltic is a self-contained packaged unit and all filters are built in. Parts are easily interchanged and can be replaced simply by removing nuts. Pumps can be replaced without timing pumps to engine.

3 ALL WEATHER PERFORMANCE. In rough weather Shell Boats get the best of both worlds. Unlike helicopters, they can still operate and still maintain their relative speed advantage over existing surface transportation.

Employees of the Compañía Shell de Venezuela are now transported to offshore drilling platforms in Napier Deltic powered crew boats that move *faster than crack Atlantic liners*. This is a big advance on existing slow surface transportation or helicopters with small payload and high operating and maintenance cost.

Power for the boats comes from two 9-cylinder opposed piston diesels. These Deltics with their "triangle" of cylinders ensure an amazing balance and freedom from vibration even with 1,620 h.p. in the engine room.

Fast, reliable, all-weather movement of men and materials has become a must for all offshore oil operations if they are to run on an economic round-the-clock basis. Napier Deltics provide twin-engined reliability and drive the fully-loaded, 50-passenger Shell Boats at an easy and safe 35 m.p.h. under continuous cruise conditions.

Plans of Napier Deltic powered crew boats specially designed for Gulf operation are available. For more information on the Deltic diesel contact the Napier Representative—L. O. Brooks, 909 Dupont Circle Building, Washington 6, D.C. Phone North 7-0146.

NAPIER DELTIC MARINE DIESEL

A new conception of Marine Power

D. NAPIER AND SON LIMITED • LONDON • W3 • ENGLAND • Partners in Progress with The ENGLISH ELECTRIC Company Ltd.

Inland River Reports

By A. D. Burroughs

INLAND river activities include the increasing pace of barge and towboat construction, some mergers of barge lines, and the continuing appearance of new shipbuilding companies, all good indications of the healthy future, and

the continuous outlet for diesel operations on the inland waterways.

COMMERCIAL Transport Corp., now merged with the American Barge Lines, with the new name, American Commercial Barge Line Co., sports a brand-new 2400 hp towboat. The 132 x 32 ft craft is reportedly the second of a triple order placed with American Marine Corp.

Named the *Stephen F. Austin*, the towboat is a duplicate design of the still-new *James Bowie*. Two GM (Cleveland) engines, Model 12-567, provide the power.

CUMMINS engines supply the 2400 hp for the new towboat fresh from Marine Welding and Repair Works, Inc. Named the *Walter Williamson*, the craft is an enlarged version of the popular *Ben McCool*, and was warmly welcomed by inland river folks and owners Greenville Towing Company are enthusiastic regarding the performance.

THE CROUSE Corp., Paducah, Ky., took delivery of the 90 x 24 ft towboat, the *Patricia*. A GM 12-567 diesel engine provides the rated 900 hp. This craft is the fourth identical vessel delivered to Crouse, from builders Nashville Bridge Co., since 1955.

THE 1957 productions from inland shipyards are carrying a good share of the push-load, all with diesels. The twin-screw *Bob Benter*, the 11th towboat delivered to Ohio River Company from St. Louis Shipyards, was a busy craft on the Upper Ohio with power from the Baldwin engines for the rated 2160 hp.

THE VERY new 3200 hp towboat, the *Sally Polk*, was busy on the Ohio petroleum trade. Recently completed by Dravo for Canal Barge Company, the power for this twin-screw vessel is provided by two GM engines.

NEAR Greenville, Miss., we saw the *Toltec*, the big powerful vessel with 3975 hp delivered from Enterprise Engines. Owned by Indian River Lines, this modern 130 x 40 ft towboat commands the attention of all riverfolks in viewing distance.

ASHLAND Oil's *Tri-State*, a consistently busy towboat on inland waters is not a new one. In service since construction at Calumet Shipyard in 1942, the 145 x 31 ft craft has the rated 2000 hp supplied by supercharged Superior engines. Two Murphy diesels provide the generator power.

PROOF that horsepower is riverpower is seen when watching the performance of the twin-screw towboat, *Iron City*. Owned by Iron City Sand and Gravel Corp., built by Nashville Bridge, this beauty of a pusher gets its 1000 hp from two 12-cylinder, Caterpillar Model D-397-D turbocharged diesel engines.

FAVORABLE reports come in often regarding the *Laura Lee*, the big air-conditioned 156 x 50 ft towboat owned by Upper Mississippi Towing Corp. Built by St. Louis Shipbuilding and Steel Company with christening in June of

this year, the triple screw boat is one of the reigning power kings with the 4800 hp delivered from three Fairbanks-Morse OP engines, model 38D8 1/8 M.

INTEREST runs high regarding the towboat to be delivered from Dravo to Sealy Power, Inc. This towboat is scheduled for service for the Olin Mathieson Chemical Corp., with measurements 200 by 45 ft, and a total 4200 hp to be supplied by two Nordberg Supairthermal diesel engines.

THE MASSMAN Construction Company, Kansas City, Mo., has a new towboat, the *Paul III*, built at Missouri Valley Steel, Inc. Power for the 45 x 14 ft boat is supplied by a GM (Detroit) Model 6-110 diesel.

COOPER-Bessemer engines, JS-8-T, are providing the fine power performance for the very busy *Hawkeye*. This 2480 hp towboat built by St. Louis Ship for Midwest Towing Company is seen regularly in the Mississippi River coal trade.

CAROL AND GARY is the double-name for the twin-screw tugboat put into recent service by Leon J. Theriot and Co. Designed and built by B. & P. Boat Works, Thibodaux, La., the 300 hp comes from two GM (Detroit) engines, Model 4-71.

THE NEAT little *Erna-A* was a good performer as well as good photographer when we snapped the tug maneuvering efficiently in the river traffic at St. Louis. Power is supplied at a rated 700 hp by four Hercules Model DFXE 6-cyl engines.

Literature on Alnor Switches

This newly prepared information lists details on all the manual and motor-driven precision pyrometer switches made by Alnor. Various models in the line provide a simple way of converting manually operated pyrometer systems to automatic continuous operation and feature many outstanding features of great advantage for the more rugged as well as more precise applications. Every reader faced with the problem of multi-circuit pyrometry will be interested in this concise presentation of a full line of products designed to meet his specific problems. Write Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill. for this literature.

(ITS NEW)

Sea Water Distillation Plant

A sea water distillation plant capable of supplying all the fresh water requirements of the Swedish-American Line's new flagship, *M. S. Gripsholm*, merits high praise, according to Karl G. Johan-

IN THE Silent Service

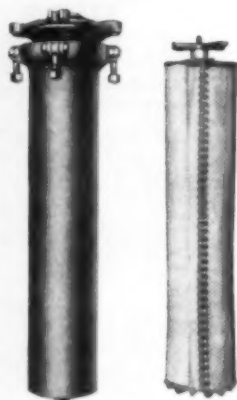


NUGENT FILTERS protect motor drive bearings aboard the U.S.S. NAUTILUS

On 17 January 1955, the U.S.S. Nautilus, world's first nuclear-powered submarine, made her maiden voyage. Since that historic day, she has traveled well in excess of 60,000 miles. Built as a "true" submarine, by the Electric Boat Division of General Dynamics Corporation, Nautilus has logged the greater portion of her travels while totally submerged.

For duty such as this, both the men and equipment that serve aboard her must be rugged and dependable. We are justly proud that Nugent lube oil filters were selected to provide positive full flow protection for the motor drive bearings aboard the Nautilus. They filter all the lube oil in circulation every cycle before it goes to the bearings, removing harmful impurities before they can reach and damage vital parts.

If your equipment demands the ultimate in filtering protection it will pay you to investigate the advantages Nugent offers. Write for full information.



Nugent bag-type filters Fig. 1116 HA-4L protect motor drive bearings aboard the Nautilus. Filter cartridges are Fig. 1116 CE-4L.

Established 1897



Wm. W. Nugent & Co., Inc.
3441 Cleveland Street Skokie, Illinois

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Representatives in Boston • Cincinnati • Detroit • Houston • Los Angeles • New Orleans • New York • Philadelphia • Pittsburgh • San Francisco • Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver • Winnipeg

sson, the luxury vessel's chief engineer. He says the two evaporators, manufactured by Emhart Mfg. Co.'s subsidiary, The Maxim Silencer Company, Hartford, Conn., "are better than any I have seen before." The veteran seaman supervised their installation at Ansaldo Shipyards, Genoa, where the ship was built. Uncomplicated operation and the evaporators' ability virtually to clean themselves cause Mr. Johansson to give high marks to the Maxim units. He anticipates that the saving in man-hours will be considerable. The modern installation can evaporate sea water into fresh at the rate of 94,000 gal. daily with purity well above U. S. Public Health Service requirements. Full capacity will be utilized only on long cruises, according to Mr. Johansson. For the transatlantic run, the plant will produce only a supplementary, but essential, fresh water supply.

A problem with conventional evaporators has been the difficulty in removing scale from the heating surfaces. Mr. Johansson has had experience with other plants which take two days to clean for every week of operation. He has served in engine room capacities on 11 Swedish-American Line ships. By employing a flexible "basket" of corrugated Monel metal as the heating element instead of the more generally-used tube bundle, Maxim has virtually solved the descaling problem. According to Mr. Johansson, the unit in operation on the vessel's maiden transatlantic crossing kept itself clean by "shocking" off scale formed by boiling sea water. This was accomplished by normal temperature changes occurring during distillation. In the Maxim process, scale is removed from the Monel metal basket heating section, utilizing differences in the coefficients of expansion of the scale and the metal. (Cold water passed over scale produces cold shock removal through metal contraction). Thus, no expensive chemical additives or tedious physical labor are needed.

Alco Arsa Exhibit

Modernization parts for thousands of diesel engines now in service on the railroads of the United States were featured by Alco Products, Inc. in its exhibit at the Allied Railway Supply Association convention in Chicago Sept. 15-18. The theme of the exhibit planned by Alco was improved Alco facilities and equipment, designed to meet the modern requirements of the railroads.

Newest of the facility improvements undertaken by Alco is a major rearrangement of the company's locomotive-manufacturing operations at Schenectady, N.Y. This modernization program, which will center production in one area

of the plant, was photographically portrayed as part of the exhibit at the ARSA meeting. The relocation work at Schenectady will result in a smooth-flowing, coordinated production pattern. It is scheduled for completion in December.

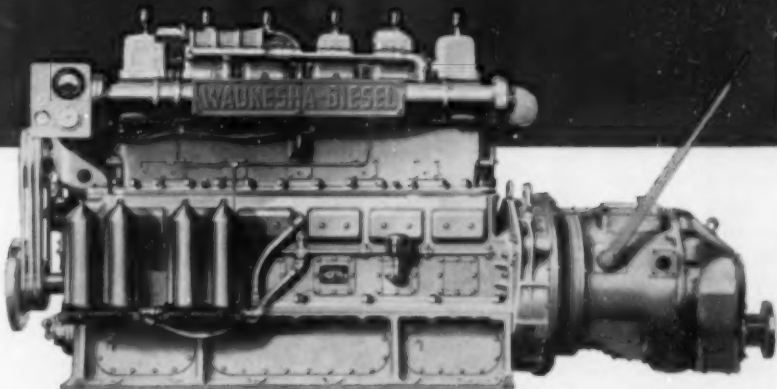
Newest modernization part to be exhibited was a secondary fuel filter ele-

ment for all Alco diesel engines which will provide improved filtration at a lower cost to the user. This filter component was recently introduced by the company. Other modernization parts shown in the exhibit included a section of an Alco chrome-plated crankshaft, a center main journal bearing, the upper half of a 124 connecting rod bearing, a set of fuel injection equipment, a Ni-

Resist exhaust manifold casting, and a Model 244 piston sectioned to show the Ni-Resist insert in the ring carrier. All of these components are included in locomotive-engine modernization kits designed to permit customers to modernize their Alco Model 244 engines with Alco parts. The filter element is the new standard for both the Model 244 engine and the newer, improved Model 251.

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| WAUKESHA normal and turbocharged diesel marine engines | Engine Model | Engine Type | No. Cyls. | Bore and Stroke | Displ. Cu. In. | MAXIMUM RATING 24-Hour Duty |
|--|-----------------|-----------------|--------------|--------------------|-------------------|--|
| | Reliance | Normal Turbo | 12 12 | 8½ x 8½ 8½ x 8½ | 5788 5788 | 665 horsepower @ 1200 rpm 990 horsepower @ 1200 rpm |
| | Defender | Normal Turbo | 6 6 | 8½ x 8½ 8½ x 8½ | 2894 2894 | 335 horsepower @ 1200 rpm 480 horsepower @ 1200 rpm |
| | Wanderer | Normal Turbo | 6 6 | 7 x 8¼ 7 x 8¼ | 1905 1905 | 240 horsepower @ 1200 rpm 315 horsepower @ 1200 rpm |
| | Resolute | Normal Turbo | 6 6 | 6¼ x 6½ 6¼ x 6½ | 1197 1197 | 195 horsepower @ 1600 rpm 260 horsepower @ 1600 rpm |
| | Vigilant | Normal Turbo | 6 6 | 5¼ x 6 5¼ x 6 | 779 779 | 150 horsepower @ 1800 rpm 195 horsepower @ 1800 rpm |
| | Cutwater | Normal Turbo | 6 6 | 4¼ x 5 4¼ x 5 | 426 426 | 100 horsepower @ 2000 rpm 120 horsepower @ 2000 rpm |

Diesel Farm Notes

By F. Hal Higgins

David Brown dealers in the U.S. and Canada are now stocked with *Agrotiller* rotary cultivators following test and approval of the manufacturer. The David Brown diesel engines power these tractors from the small 2D rear engine model to the large sizes.

Massey-Harris-Ferguson is acquiring Standard Motor Co., Ltd., with factory at Coventry, England, for automobile manufacture. The Standard company had been manufacturing the Ferguson tractor for much of the eastern hemisphere trade. Economy of production is the aim of the merger.

A new diesel-powered combined harvester is coming onto the European market from Czechoslovakia. After extensive tests over the past 18 months it was announced to the trade late this summer with a 60 hp 4-cylinder direct injection diesel engine as its self-propelling power. It has an 11 ft cut. The *Agrostroy* factory at Prostějov, Czechoslovakia, is the builder.

Lanz, the German company recently purchased by Deere & Co. of Moline, Ill., announces two new vegetable crop harvesters to be powered by its diesel

tractors. One aimed at the European market is the Lanz SR1 tractor-mounted potato digger. Latest is the Lanz carrot harvester that windrows the carrots but will elevate them into truck or cart driven along side the harvester. Their bulb harvester is now accepted as a success. Both vegetable harvesters are hung on the Lanz *alldog* tool carrier.

Allis-Chalmers is powering its *Gleaner* self-propelled combined harvester with a Perkins 70 hp diesel for the European market. It will be in the hands of dealers next year. Field trials in the heaviest crops this season proved it highly efficient with plenty of power in all terrain and crops.

An order for 50 diesel Fordson Majors was recently filled in England for the Nottinghamshire Crop Driers, Ltd., with acreages in England and Scotland.

Burmeister & Wain, famous diesel manufacturers of Denmark, has through their subsidiary Nordisk Tractor A/S, purchased the Massey-Harris-Ferguson assets in that country and will have the exclusive franchise for the M-H-F line in Denmark.

International Harvester's TD 18 will be powered by a Rolls-Royce 6-cylinder diesel for production at the Donchester Works of International Harvester in

Great Britain. It is aimed at the industrial and construction field. Expansion of the Donchester plant will bring investment up to around \$20,000,000 for the production of 3,000 big crawler tractors per year.

F. Perkins, Ltd., is celebrating its silver anniversary in diesel engine building. Last year was a record year for Perkins diesels, the annual report showed. For the first time since the Canadian branch, F. Perkins (Canada) Ltd., was set up, sales passed the million dollar mark last year with 1957 promising a still bigger sales year. The Cockshutt 40 PD tractor is powered by a Perkins diesel. And Hyster's fork-lift trucks are using Perkins diesels in the powering of their product from Portland, Oregon, factory. Yugoslavia has recently purchased 2,000 Ferguson tractors with Perkins diesel engines.

The University of Nebraska recently held a Tractor Field Day in which the famous Nebraska Tractor Test was dramatized with a showing of old and new from the earliest tractors tested there to the biggest International, Cat, Allis-Chalmers, Oliver, Eimco, Massey-Harris, Ford, Minneapolis-Moline, Ford tractors that have been getting the tests recently. An old Case steam engine as well as earliest gasoline tractors such as the Froelich, Townsend, Moline, Hart-

Parr, etc., were in the parade that dramatized the progress made over the quarter century since the Nebraska test was launched. The Froelich was an 1892 root of the modern Deere. Townsend was a gasoline tractor of about World War I era. Moline was the 2-wheel general purpose wheel tractor of World War I.

Lubricant For Free Piston Engines

A high load-carrying lubricant designed expressly for trouble-free cylinder lubrication of free piston gas generators has been introduced by the Shell Oil Company, New York, under the name "Free Piston Engine Oil". More than six years of laboratory research and intensive field testing went into the development of this oil, which is reported to minimize ring and cylinder liner scuffing and scoring, rapid ring wear, deposit formation in engine case and upon compressor delivery valves. Shell states that the new oil is being made available to meet the lubrication requirements of the quantity of free piston gas engines now being produced in Europe and in the United States for electric utility, marine and locomotive use. This type of engine is also being seriously considered by three major automobile producers in U.S.A. and one major French maker for possible automotive

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Water-cooled, two-cylinder, v-type, 4-cycle, 15 BHP @ 1800 RPM



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use. In the development of this new oil, Shell has cooperated extensively with one of the pioneers of the free piston engine industry—Societe Industrielle Generale de Mecanique Appliquee (SIGMA), Lyon, France. The oil is presently in use in practically all the gas generators built by this company and their licensees in U.S.A., with the exception of those operated by the French Navy. According to SIGMA, "Shell has given the most attention to finding a suitable oil for the lubrication of GS 34 generators and was the first to develop an oil which satisfied the lubrication requirements of these units in continuous service".

While early work on free piston engine projects began in Europe before the last war, production of commercial units did not start until 1949 when SIGMA introduced units for use in electric generation, locomotive drive and ship propulsion. These engines, based upon Pescara patents, utilized a comparatively low-pressure, low-temperature gas (50 psig, 945°F) discharge from the free piston unit to run the turbines. Basically, the free piston engine is similar to a gas turbine, with this difference—a reciprocating instead of centrifugal blower is used. There are two pistons in a horizontal cylinder and fuel is supplied between them. When the pistons advance, the fuel-air mixture is compressed until it fires. This explosion throws the pistons apart. Compression of air behind them moves them forward again.

Powered hot gases feed a turbine that drives the wheels. Because of the comparatively low temperature of gases from the free piston engine, there is no need for special alloy materials for turbine blading. It was the combination of the high compression pressures and piston temperatures which originally gave rise to lubrication problems. Initially, Shell's entry into the field dates from late 1950 when SIGMA had begun small-scale production of GS 34 units. At that time, test bed runs at Lyon had revealed that cylinder and piston ring wear rates and cylinder and piston cleanliness were unsatisfactory—problems that were traced to the limitations of the heavy steam cylinder oil used for cylinder lubrication.

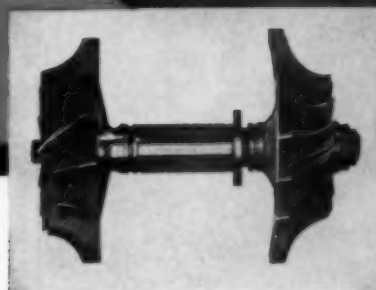
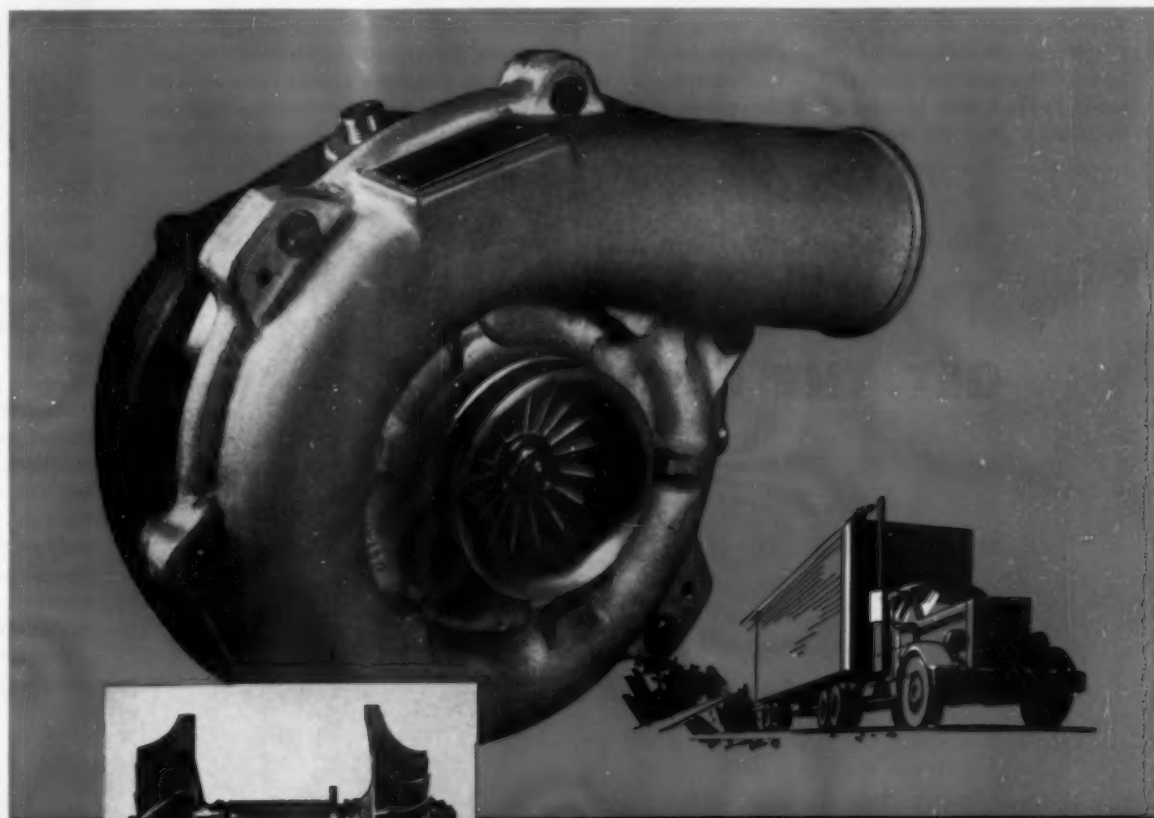
Various Shell oils were tested in the following two years and the best was subjected to a 500-hour endurance test in 1952 in a two-cylinder electric generator unit at Reims. At the conclusion of this test a strip-down of the engine revealed a marked improvement in cleanliness and a sharp reduction in wear. An additional 600-hour test produced similar results and also a decided decrease in compressor delivery valve deposits and air-box fires, as a result of

a joint effort of both the free piston engine makers and Shell. Over the next four years refinements and improvements were made in each successive oil based on the test results of SIGMA engines. Concurrently with the Lyon and Reims tests, long-term tests were also being run by General Motors in the United States on a SIGMA built GS 34 generator. The results of all the

tests, here and abroad, was the development of Shell Free Piston Engine Oil. This high detergency oil with good dispersant properties has proved to be excellent for cylinder lubrication of free piston engines. Too, Shell's Talona Oil 20 is used for piston cooling and lubrication of the synchronizing gear, and also as a means of reducing deposit formations in the air box.

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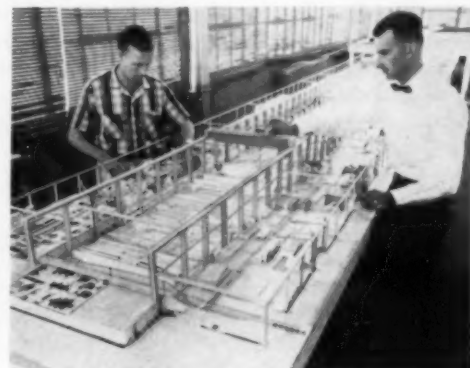
Manufacturing Facilities Modernized

Alco Products, Inc. has embarked on an extensive rearrangement of its Schenectady manufacturing facilities designed to give the company one of the most modern and efficient locomotive manufacturing plants in the nation. The initial phase of the program is scheduled for completion in December at a cost in excess of \$1 million. It calls for extensive modernization of three buildings—the present general welding shop, sub-assembly and truck shop and the miscellaneous machine shop. Subsequent rearrangement work, designed to complete the integration of locomotive production into the west side plant area, will be accomplished in the future. All of the buildings affected by existing plans for the rearrangement project

are in the westernmost portion of the 112-acre Alco plant. When the modernization is completed, these buildings will be laid out so that materials flow into what is now the general welding shop, where progressive-station assembly lines will move locomotives from the large, prefabricated assemblies through final painting. The new facilities will replace the present locomotive erection shop, on the east side of the plant, which has been sold to the Senoc Development Corporation of Houston, Texas.

When the locomotive-production rearrangement is completed, the general welding shop will be converted into a long building divided into two main areas. The center bay in the southern half will be used for producing floor frames and side trusses

for locomotives. Sub-assemblies for those major components will be produced in adjoining bays and moved into the main shop area for final assembly. North of a transfer track bisecting the



Portion of scale model of Locomotive Assembly Building.

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Diamond Chain President



G. E. Schloot

At the regular meeting of The Board of Directors of The Diamond Chain Company, Inc., in Chicago, July 23, 1957, G. E. Schloot was elected President, succeeding C. P. Kottowski who submitted his resignation because of ill health. Mr. Schloot is a graduate of Purdue University in Mechanical Engineering, Class of 1917. He has been an employee of the Diamond Chain Company more than forty years and has served as Production Manager, Factory Manager and as Vice President and Personnel Director. Mr. Schloot is a member of the Broadway Methodist Church, the Purdue Alumni Association, the Indianapolis Personnel Association and the Rotary Club. He is a Director of the Society for the Advancement of Management and of the Diamond Chain Company. C. A. Turner, Assistant Personnel Manager will succeed Mr. Schloot as Personnel Director. Mr.

Turner is a graduate of Purdue University, a member of the Indianapolis Personnel Association and has been associated with the Diamond Chain Company since 1946. William V. Covert, Chief Engineer and Benjamin K. Sollars, Factory Manager, were elected to the Board of Directors. The new officers of the Company are G. E. Schloot, President, H. N. Cottingham, Vice President, Dale R. Hodges, Secretary Treasurer and Robert M. Neale, Assistant Secretary and Treasurer. Mr. Kottowski will continue as an active member of the management staff in a consulting capacity.

Off-Highway Trucks In Action

Carrying on the tradition of the fabled Death Valley 20-mule teams, a fleet of Kenworth Model 802 rock and ore movers is serving the world's largest known sodium borate ore deposit for the United States Borax & Chemical Corporation, Pacific Coast Borax Company Division. A detailed story on converting this deposit to an open pit mine appeared in January, 1957 issue of DIESEL PROGRESS. Out in the Mojave Desert, about midway between Barstow and Mojave, the Kenworths haul ore from the new open-pit mine at Boron, Kern County, California. Ore production began in May. The 802's make a 14,000 ft round-trip haul upgrade from the benches of the pit to the crusher and return to the pit. Elevation at the shovels which load the 24-ton Kenworths is 2,250 ft and at the crusher is 2,460 ft, for a climb of 210 ft in the 7,000 ft trip to the crusher.



Increasing demand for borate products as boron chemistry is developed makes the mine's vast deposit more valuable. The sodium borate ore moves in the end-dump Kenworths to eventual use in hundreds of products including household soaps, jet and missile fuels, nuclear developments and plastics and industrial applications. The Pacific Coast Borax Company Division, United States Borax & Chemical Corporation, in its new \$20,000,000 Boron project includes concentrating and refining facilities to process boron ore from the mine. Conversion from underground to open-pit mining is enabling the firm to utilize all grades of ore from the mine. The 12 Kenworth 802's at the Boron project have 300 hp turbocharged Cummins industrial diesel engines and Allison torqmatic transmissions. Front axles have a 25,000 lb capacity and rear axles have a 70,000 lb capacity. Kenworth variable steel section frames have a measurement of 15½ in. at the deepest section on these units and tubular torque members. Power steering and oversize air-operated brakes are among engineering features of the Kenworth 802 rock and ore movers. The United States Borax & Chemical Corporation purchased its Kenworth rock and ore

mover fleet through the Los Angeles branch of J. T. Jenkins Company, Kenworth distributors.

New Starting Fluid

The new super-hot formula of Surefire Motor Starting Fluid has made great strides with consumers since its introduction a short time ago, and the product is now being distributed on a nationwide basis, it has been announced by Art McNeill, vice-president of the Wilco Co., manufacturers of Surefire. With its new formula, Surefire Starting Fluid gives faster, safer starts to gasoline and diesel engines down to 65° F. below zero. Its low ether content protects engines against upper cylinder area damage and reduces engine wear by eliminating slow, hard starts in damp or

cold weather. It also reduces loss of time of men and equipment, plus prolonging life of batteries and starter equipment. Surefire is an economical and sure method of starting tractors, trucks, cars, chain saws, power motors, etc., and is currently being sold with double money-back guarantee. It provides an easier and safer method of application, by simply spraying from the pressurized can directly into the manifold or air intake. Surefire meets all ICC requirements and is approved by the New York City Fire Department. Currently stocking Surefire are Western Auto, Firestone, Coast-to-Coast, Gebhart and other leading automotive supply dealers. Further information may be obtained by writing Wilco Company, Industrial and Commercial Division, 4425 Bandini Blvd., Los Angeles 23, California.

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AP-174-819

West Coast News

By James Joseph

TO CENTRAL Construction Co., Seattle, a Michigan 125A tractor shovel (2 yd) powered by a GM Detroit diesel, model 3057C, Series 3-71, 96 hp at 2000 rpm.

SOLD to Industrias Unidas del Pacifico, S.A., Mexico, a 7 cylinder, 525 hp Fairbanks-Morse model 38F5¼ diesel engine.

FOR E. C. Swaggard's mobile rock-crushing plant, working the Eugene, Ore. area, an 8DCSG-2505 Allis Chalmers 300 kw continuous at 1200 rpm, 440 volt generator, trailer-mounted, hydraulic starting.

TO REPOWER a Washington yarder (model 203), Weyerhaeuser Timber Co., Springfield, Ore., has taken delivery of a 6DS-844 Allis-Chalmers diesel with fluid coupling. Engine develops 280 hp at 2100 rpm.

AN 8 cylinder Model 38D8-¼ Fairbanks-Morse diesel has gone to La Perla Minas de Pierro, S.A., Monclova, Coahuila, Mexico.

FOR THE U.S. Fish & Wildlife Service's International Sockeye & Game Patrol Boat *Canvasback*, a GM series 4-71 marine diesel—replacing a gas engine.

TO TACOMA'S Cascade Pole Co., a

GM series 4-51 industrial diesel, for installation in their Link Belt steam crane.

PORTLAND's Hamilton Engine Sales, Inc. has delivered two 6DASMR-844 marine engines with Capitol 3:1 reduction gear for a 107-ft pleasure craft, due for launching Sept. 1. Purchaser was Don Keebler.

PORTLAND's General Construction Co. has repowered a Bucyrus Erie shovel with a 6DC-1879 Allis Chalmers diesel with Twin Disc clutch.

FOR THE tuna boat *Eileen*, owned by Newport, Oregon's Ed Calkins, a 6DA MR-844 Allis-Chalmers marine engine with Capitol marine hydraulic gear.

INTO cargo loading winches for ocean freighters have gone two GM 3-71 series power units. Purchaser: Seattle's Markey Machinery Co., Inc.

INSTALLED in their Pioneer jaw crusher (10 x 36) is a GM 4-71 series, enclosed power unit—working for Seattle's N. Fiorito Co.

FOR ANCHORAGE, Alaska's Wm. A. Smith Contracting Co., Inc., a GM Detroit engine, 134 hp at 2000 rpm, series 4-71, powering a Michigan 2¾ yd tractor shovel.

FOR HIS gillnetter, operating the Wrangell, Alaska, area, John Grover (of Seattle) has taken delivery of a GM

4-51 series diesel, replacing a gasoline engine. Sale via Seattle's Evans Engine & Equipment Co., Inc.

TO CALEXICO Auto Parts, Calexico, Calif., a Fairbanks-Morse model 48A3½, 4 cylinder, 28 hp engine.

CHRIS Berreth, Molalla, Oregon, has purchased for his gravel plant on the Clackamas River, an 8DA-1125 Allis Chalmers diesel with 100 kw Electric Machinery generator. Unit is portable.

TO PORT ANGELES, Washington's Koidahl Logging Co., a model 4080 GM diesel, 143 hp at 2100 rpm, series 4-71, for powering a Baldwin-Lima-Hamilton 25-ton log loader.

FOR POWERING its smelter's conveyor, Hanna Nickle and Smelting, Riddle, Ore., has taken delivery on an HP-351 Allis Chalmers closed-type power unit.

MORRISON Knudsen Co., Hells Canyon Project (Cambridge, Idaho) has purchased an 8-17 CK Clark Torque converter—for 54-B Bucyrus-Erie shovel working the Snake River.

FOR THEIR Manitowac shovel working Cougar Dam, Jones-Tompkins, Cougar, Washington, has purchased an 11-17CK Clark Torque converter.

Sale of 40 Buses

Sale of 40 new transit type buses to the Eastern Massachusetts Street Railway Co., of Boston, was announced today by Mack Trucks, Inc. Robert W. Tyson, Jr., Manager of Mack's bus division, said delivery of the new Thermodyne diesel engine powered buses will begin in the late fall. They will be of 45-passenger capacity and will include such Mack features as pressurized ventilation systems, extra-wide aisles, high head room and the Mack airglide suspension system to provide maximum riding comfort. The Eastern Massachusetts Street Railway Company operates a fleet of 500 buses, many of them Macks, serving 74 communities in eastern Massachusetts. Mr. Tyson said the Boston firm's decision to buy additional Macks was prompted by an exhaustive six-month test of bus performance under all operating conditions.

Aeroquip Sales Appointments

Mr. Victor Emery has been named manager, manufacturers sales, of the Aeroquip Corporation Industrial Division. Sales offices for the division are located at the company's general headquarters in Jackson, Michigan. Announcement of the appointment was made by Mr. William F. Rogge, general sales man-

ager of the industrial division. Mr. Emery's responsibilities will include sales of all industrial products to original equipment users. He was most recently marine sales manager, and has been associated with Aeroquip in a sales capacity since joining the company in 1949. He is a graduate of Michigan State University.

The appointment of Mr. James I. Melencamp as manager, marine sales, was also announced by William F. Rogge. The sales offices for the division are located at the company's general headquarters in Jackson, Michigan. Mr. Melencamp will be in charge of sales of Aeroquip's marine products, which include flexible piping, segmented fittings, split flange and union end fittings, and various other piping equipment for marine applications. These products are used on dredges, fishing craft, tugs, Naval vessels, and large cargo and passenger ships.

New Diesel Pile Hammer

The trend to diesel powered pile hammers has been accelerated by the introduction of a diesel pile hammer of unique design by Link-Belt Speeder Corporation, subsidiary of Link-Belt Company, as a complement to its line of shovel-cranes. The Link-Belt Speeder diesel pile hammer is easily transportable, is completely self-contained, needs no auxiliary equipment and is one-man controlled, according to the company's announcement. The diesel pile hammer eliminates the need for costly compressors, boilers, high-pressure hose, fresh water supply and other auxiliary equipment required for conventional air or steam hammers. The use of the new diesel pile hammer can transform any power crane economically into a pile driver, the company pointed out. A single cable to hoist the hammer into the leads in which it operates, is all that is necessary to position it and to start its operation.

The new diesel pile hammer is a self-contained, free-piston, compression ignition machine operating on the two-cycle principle. Energy is delivered to the pile head, through the anvil, in three stages; pre-load, impact and explosive force. Unlike the conventional diesel pile hammer in which the ram or piston is free to rebound beyond the top of the open cylinder head, the Link-Belt Speeder pile hammer incorporates a closed cylinder top which traps and compresses air to form an air spring.

This air spring limits the upward travel of the ram, accelerates the ram downward and enables the hammer to obtain more blows per minute and prevents the entry of any foreign matter into the

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cylinder. Also this design results in a shorter overall length of this hammer.

Enclosure of the cylinder top makes possible an unusual three-phase power cycle which maintains a more constant load on the piling. Keeping the pile in more constant motion prevents it from setting up and minimizes the brooming, spalling or buckling tendency that can occur with hammers utilizing a series of sharp, individual impacts to drive a pile. Another advantage is one-man operation. After the new hammer is placed in position in either swinging or fixed leads and the throttle control connected, the crane operator can regulate its operation with a remote hydraulic throttle control system either in the cab of the crane or from the ground. He can vary the force of the blow from idle to full power and can stop the hammer when the piling has been driven to the required depth. The starter is integrally mounted on the hammer and rides with it. The hammer has a recess for driving wood piling and adapter assemblies are available for driving pipe, sheet, H-Beams or concrete piling.

Ease of starting distinguishes the new diesel pile hammer. To start, the ram is merely lifted and dropped. As it nears the end of the down-stroke, it engages a cam-roller-operated fuel pump which injects atomized fuel under high pressure into the combustion space between the ram and the anvil. The continued down-stroke of the heavy ram compresses the air to ignition heat. The ensuing explosion and impact drives the anvil downward against the pile and the ram upward, and the cycle is then repeated as in a conventional 2-cycle diesel engine. In cold weather, and for starting in soft footing, a glow plug or incandescent point, preheats the atomized fuel, and assures fast efficient firing. This unit can be controlled remotely by the operator. The new Link-Belt Speeder diesel pile hammers require little maintenance. There are few moving parts—no wrist pins, connecting rods, crank shaft or camshafts. Primary lubrication is provided for by a cam-operated oil pump actuated by the ram's up and down movement. The ram is precision-machined from a high-quality steel forging (1045 steel, 180-220 Brinell). The two-part cylinder is manufactured of ductile iron. The lower half is chrome plated and then honed.

The new line includes three models which can be used on any make of power crane. One (Model 105) delivers up to 7,500 ft lbs per blow and strikes 90 to 98 blows per minute. Another (Model 312) delivers up to 18,000 ft lbs per blow at from 100 to 105 blows per minute. The largest (Model 520) exerts up to 30,000 ft lbs per blow 80 to 84 times

per minute. The three range in length from 10½ in. to 13½ ft and weigh from 3,600 to 12,500 lbs. The prices of the Link-Belt Speeder diesel pile hammers range from \$8,250 to \$16,500. In most areas, the new hammers are available through Link-Belt Speeder shovel-crane distributors. Details are available in a new catalog No. 2582 which may be obtained from Link-Belt Speeder Corporation, Cedar Rapids, Iowa, or the company's distributors.

ITS NEW

Industrial Brakes and Clutches

The Dynamatic Division of Eaton Manufacturing Company has recently introduced a new line of industrial brakes and clutches. The new Eaton *Dyna-torQ* units are electro-magnetically operated disk-type, friction brakes and clutches.

Dynamatic is a producer of industrial brakes and clutches. *Dyna-torQ* clutches and brakes operate on the principle of electro-magnetic engagement of two friction members—the armature and the field magnet—to develop driving or braking torque. A number of key features are claimed for the *Dyna-torQ* line, among them the simplicity of controls and the fact that the controls may be remotely mounted to conserve space on the processing equipment, extremely rapid response in clutching and braking, smooth engagement of the *Dyna-torQ* members, highly effective cooling, automatic adjustment and low maintenance cost. Four types now in production are the basic clutch, the basic brake, the clutch-brake and the clutch-coupling—all available in a wide range of capacities. Fred L. Hopf, general manager of this Eaton Division pointed out. An important feature is that corresponding parts of all units in a given size are completely interchangeable. Mr. Hopf said the new brakes and clutches are especially suited for use in the field of automation, and have application in machine tools, material handling equipment, packaging machines, textile and paper processing equipment and in many other industries. For more information write Dynamatic Division, Eaton Mfg. Co., Kenosha, Wisconsin.

ITS NEW

Diesels For Venezuela

Electro-Motive Division of General Motors sent three of their chief executives for the opening of a new branch of the Puerto Cabello-Barquisimeto Railroad in Venezuela. The government railroad's newest acquisition adds to what it is already operating, namely, six GM 1750 hp locomotives on the Puerto Cabello R. R., three GM 1350 hp locomotives and eight 1750 hp GM locomotives on the Guanta-Naricual spur and three 900 hp GM locomotives for the

Orinoco Mining Co. to help in their exploitation of the iron ore mines. The visit of Mr. N. C. Dezendorf, GM vice president, and executives K. W. Doelling and H. G. McClean was of considerable importance at this time as the opening of this new railroad branch will open up the agricultural and economic regions of the central and western zones of Venezuela.

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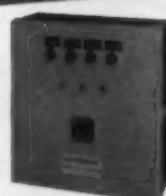
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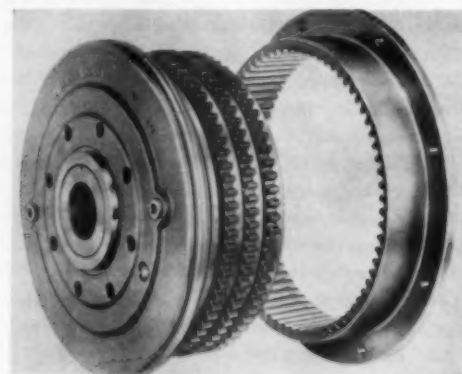
F. I. Goodrich

The election of Frank Ivor Goodrich as Vice President-Administrative of Eaton Manufacturing Company, effective September 1, 1957, was announced recently by John C. Virden, Chairman and President, following the monthly meeting of the Board of Directors. Mr.

Goodrich succeeds F. H. Mott who is retiring from this position after 38 years of service. Prior to his election, Mr. Goodrich was staff assistant to Mr. Mott, a position to which he was appointed several months ago. For years he was general manager of Eaton's Spring Division in Detroit. Mr. Mott, who will continue as a director of Eaton, is one of the oldest executives in point of service, having joined the accounting department of the Rich Steel Products Company, one of Eaton's predecessor companies, in 1919. He was made Vice-President-Administrative in charge of all Michigan plants of Eaton and a director in 1954.

In the post of Vice President-Administrative, Mr. Goodrich will direct the activities of all Michigan plants—the Spring Division, Valve Division in Battle Creek and Lawton, Aircraft Division in Battle Creek, Saginaw Division in Saginaw, Foundry Division in Vassar, Pump Division in Marshall and Powdered Metals Division in Coldwater. He will continue with his headquarters in Detroit.

Air Clutches



Production of new 8, 10 and 11½ in. size air clutches, as additions to the PO Air Clutch line, has been announced by Twin Disc Clutch Company, Racine, Wisconsin. The new models are ideally suited for machinery and equipment where high torque capacity and long life are a requirement. They are low in cost—are available in triple-plate, double-plate and single-plate construction and have a maximum torque capacity of 3503 lb-ft. A feature of these new air clutches is their cartridge-type diaphragm, which represents the culmination of more than 10 years of diaphragm research. This diaphragm is constructed of neoprene reinforced with nylon and its design is such that leakage is eliminated. It provides uniform torque and automatically compensates for wear without adjustment.

The new clutches are compact and have narrow widths that permit their replacing drum or band

clutches. They are of heavy-duty construction and feature a clutch mass properly distributed relative to friction area, providing long life on high energy loads. Thick cast-iron center plates are utilized for maximum heat distribution. Air pressure to 130 psi may be used with these air clutches. Release is quick owing to the small volume of air required and large low-rate release springs used.

The new Twin Disc 8, 10 and 11½ in. air clutches are adaptable wherever the convenience of remote air control is desired. They are currently in use on rock crushers, tractor winches, pipe-extruding machines, drilling rigs, machine tools, pug mills and other types of industrial equipment and machinery. Addition of the three sizes extends the Twin Disc line of PO Air Clutches from 8 to 36 in. in diameter, with torque capacities to 126,600 lb-ft. For further information, write Twin Disc Clutch Company, Racine, Wisconsin. **ITS NEW**

Botruc Joins Cheramie Fleet

Newest addition to the expanding fleet of Lefty and Minor Cheramie is the *Botruc*, a 64 ft, six in. T/S Supply Vessel, built by Blount Marine Corporation, Warren, Rhode Island. The *Botruc* was powered by George Engine Company, Inc., Harvey, Louisiana, with a symmetrically matched pair of General Motors diesels, model 62206LB and Rd. These engines feature 32-volt starting motors with battery charging generators and a 3 to 1 ratio hydraulic shift reverse and reduction gear driving 42 in. three-bladed propellers. Twin rudders are

mounted in bottom shoes. The large, all-purpose supply vessel has accommodations for and will sleep a crew of four, as well as seat twelve passengers. Two large cowl vents, built on either side of the engine room hatches, provide adequate ventilation below decks.

The *Botruc* has a beam of 23 ft and draft of seven ft, six in. Her cargo area includes a clear main deck 45 ft long by 22 ft wide inside the bulwarks.



The deck is heavily reinforced to accommodate concentrated loads with the center lane built to roll on and carry a 40-ton vehicle. In order to facilitate loading, bulwarks are removable from sides and stern. Electrically, the *Botruc* is equipped with a complete 32-volt system to go with the 1500-watt generators on each engine. She carries an auxiliary 3 kw Onan water-cooled diesel generator set and all electrical fixtures are U.S. Coast Guard Approved. There's adequate lighting, inside and out, plus a 10-inch searchlight.



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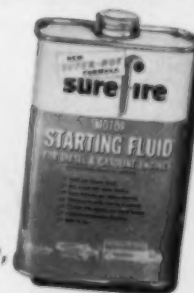


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Stratoflex Opens Plant



Stratoflex, Inc., manufacturer of flexible hose assemblies and hose fittings, recently opened a new branch plant at Fort Wayne, Indiana. Announcement of the plant opening, the fourth in the United States and Canada, was made by Ken W. Davis, Stratoflex president, Fort Worth, Texas. The new plant has 15,000 ft of floor space and is designed to expedite deliveries to the East Coast and Middle West, Mr. Davis said. Other Stratoflex plants are located in Fort Worth, Texas; Los Angeles, California; and Toronto, Canada. The new Fort Wayne plant is under the direction of Plant Manager J. C. Nolan and is fully equipped to manufacture the complete range of Stratoflex flexible hose assemblies used in aircraft and industrial fuel, oil, hydraulic and pneumatic systems.

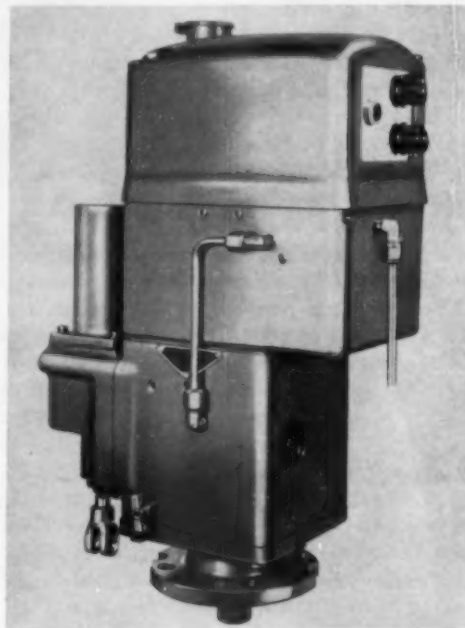
New Woodward Governor

The Woodward PG-PL Governor has been used for years by the diesel industry for automatic speed setting by pneumatic means. Process plant design engineers, engine and turbine builders re-

cently have requested increased accuracy of the pneumatic speed setting, and also electric speed setting. A new ultra-precise setting mechanism was developed by Woodward Governor Co. and is now available on the Woodward PG-PL Governors. This more accurate speed setting mechanism is a completely new design specifically developed for applications requiring great precision. It responds to a .001 psi change in control air pressure within the usual 3 to 15 psi range. It can also be operated in other pressure ranges. The usual accessories, such as pneumatic or electric shutdown devices are available. The Ultra-precise Woodward PG-PL Governor can also be furnished to operate from the output of electric controllers now in general use, as well as from pneumatic controllers. This eliminates the need for electro-pneumatic transducers formerly required.

Additional advantages of this new governor are that it is easily adjusted in the field for any desired air pressure vs. speed relationship or for reverse speed setting. It can be adjusted for extra low stand-by idle speed, for normal minimum speed or to shut down an engine or turbine by direct speed setting. This new ultra-precise Woodward PG-PL Governor is suitable for all applications where accurate speed control of turbine or engine is required with pneumatic (electric) speed setting. It is used for maintaining constant pressure or suction; constant flow, liquid level, temperature, or any other quantity which can be controlled by an air or electric controller to set governor speed. Specific applications include air and gas compressors for catalytic cracking and other petroleum processes, refinery charge pumps, gas

and liquid pipeline pumping stations, chemical plants, blast furnace blowers, forced and induced draft fans, boiler feed-water pumps, and air separation plants. It is also used to provide manual



PG-PL governor with ultra-precise pneumatic speed setting.

pneumatic speed setting from a remote point to control one or more prime movers simultaneously as in sugar mill and marine propulsion applications or in plants where hazardous atmosphere precludes the use of electric motors for speed-setting.

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- 4 **ACCESSORY EQUIPMENT** — Recent developments in fuel systems, exhaust systems, and other key accessories are fully described and illustrated fully in this section.
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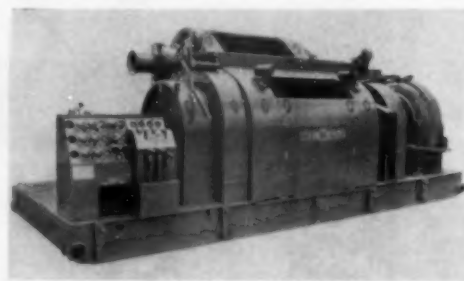
K. O. Keel

The appointment of K. O. Keel, as General Sales Manager of the Cleveland Diesel Engine Division of General Motors was announced recently by Thomas E. Hughes, Division General Manager. Keel, a native of Norway joined the Winton Engine and Manufacturing Company, predecessor company to the Cleveland Diesel Engine Division of General Motors in 1920 as Test Engineer. He held various positions until he was made Chief Engineer in 1936 and in 1953 he was named Government Sales Manager. In his capacity as General Sales Manager, Keel will head up all the sales activity of the Division. This will include marine sales, industrial sales, government sales and the sales engineering which comprises the proposal and hull design section. Mr. Keel is a member of the Cleveland Athletic Club, Westwood Country Club, the Whitehall Club, Marine Club, the Masonic Order, the American Society of Mechanical Engineers, Society of Automotive Engineers, Society of Naval Architects and Marine Engineers, the Society of Naval Engineers and the Newcomen Society. He is married and lives at the Westlake Hotel, Rocky River, Ohio.

Electric Drilling Rig

Development of the first of a series of drilling rigs intended primarily for electric application has been announced by The National Supply Company. The new rig is in the class of National's biggest mechanically-powered rig, the Type 160, introduced in 1948, which in 1949 was the first to drill below 20,000 ft. Identified as the Type 1625 DE, it will normally be considered for drilling in

the 16,000 to 25,000 ft depth range, using 1 3/4 in. or 1 1/2 in. wire line, and utilizing from 1,300 to 2,000 hp delivered through electric motor drives. The Type 1625DE draw works is basically of one-piece design, on a heavy 18 in. beam base, and embodies provision for a sand reel. A rear section that accommodates the electric motors and the motor drive portion of the draw works transmission may be detached for transportation purposes. The rotary may be driven by a countershaft, accommodated on a small, detachable front section of the draw works base, or by an independent electric motor. The transmission shaft carries two drives to the drum and there is a choice between two additional drives on the primary shaft of the motor drive, thus affording a choice between four hoisting speeds. The drives are arranged to provide the most efficient use of power and to assure the fastest operation commensurate with good drilling practice. Two speeds are available to the catheads (and sand reel if one is used) and to the rotary drive.



The large drum, 36 in. in diameter and 61 1/4 in. long, permits hoisting 135 ft stands of drill pipe with eight lines without spooling more than three full layers of line on the drum. It is integrally grooved and is surface-hardened at points of wear. Effective braking is assured by the use of the National Type K-62 Compound Equalizing Brake, designed specifically for use with this size drum. Air friction clutches are used on the drum shaft to provide ease of operation and eliminate shock loading. The low drum clutch has a slipping torque rating of 201,000 ft-lbs, and the high drum clutch of 90,000 ft-lbs, with 100 lb air pressure. A jaw clutch is built inside the low drum clutch for standby purposes. A Dy-A-Flex Clutch, with Air-flex Inertia Brake, provides the disconnect from the rotary machine. National's Type "A" Catheads are standard equipment. Power for the Type 1625DE draw works is provided by two or three 625 to 650 hp motors or two 1,000 hp motors, coupled together on a separate skid which is aligned with and bolted to the rear of the main draw works frame. The two-speed drive, which can be equipped with an inertia brake if required, is between the motor drive shaft and the draw works jackshaft.

ITS NEW

Engineering and Research Laboratory

Allis-Chalmers Manufacturing Co. broke ground recently for a new \$3,250,000 engineering and research laboratory at its Harvey, Ill. Works. The building is being constructed on a portion of the 35 acres the company purchased recently in the City of Phoenix, which is located just east of Harvey Works Plant No. 2. It brings to 65 the number of acres the Works now occupies. The multi-million dollar program represents a major

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expansion of Harvey Works engineering facilities. It will provide a central engineering building, an engine and material handling product development laboratory, and an engine test wing accommodating 32 engine dynamometers. Equipment to be installed will permit engineering to employ the most recent research and development techniques, including those for advance instrumentation and industrial photography. The building project, according to Owen J. Higgins, General Manager of the Harvey Works, also includes an experimental machine shop, a metallurgical laboratory, and a proving ground for material handling equipment. The site is also sufficiently large for future expansion of the Harvey Works.

Products of the Harvey Works include gasoline, diesel, natural gas and LP gas engines and power units; marine diesel engines; electric generator sets and material handling equipment including lift trucks and industrial tractors. The engines are used extensively in such Allis-Chalmers products as crawler and wheel tractors, in motor scrapers and graders, and in other construction and farm equipment made by the company. They are also



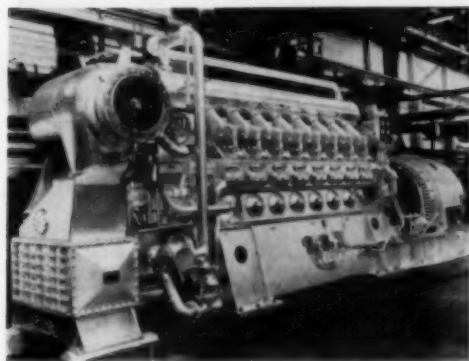
Artist's conception of new \$3,250,000 engineering and research laboratory at the Harvey, Ill. Works of Buda Division of Allis-Chalmers Mfg. Co.

the power supply for cranes, shovels, motor trucks and other units built by many leading manufacturers of such equipment throughout the country. When construction of the new facilities is completed next Spring, and engineering departments have relocated to their new quarters, the space vacated by these departments will be readied to provide much needed additional room for the Works administrative and production departments, according to Mr. Higgins. Architect and general contract for the project is the H. K. Ferguson Co., Cleveland, Ohio.



Shown at generator set display during ground breaking ceremonies are the following from left to right: J. C. Baseheart, Engine Sales Manager, A. F. Ochtman, Manager, Engines, Engineering Dept., Harvey Works, L. C. Daniels, General Manager, Buda Division of Allis-Chalmers Mfg. Co., William A. Hart, Manager, OEM Engine Sales, and Owen J. Higgins, General Manager, Harvey Works.

Diesels For Cuba

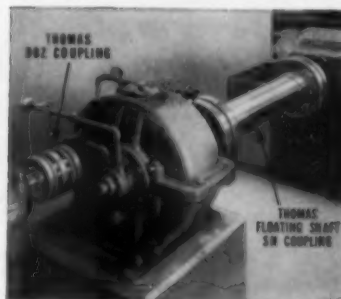


The above is the first of ten turbocharged 2-cycle diesel engine-driven 2,000 kw generator sets, built by Cleveland Diesel Engine Division of General

Motors, and recently shipped to Havana, Cuba, from its Cleveland, Ohio, plant. These new electric generator sets were ordered by Compania Cubana de Electricidad, S.A., which is associated with the American & Foreign Power System. They will be installed at the old Rinion de Melones power plant on the outskirts of Havana. The plant will supply power to meet Cuba's rapidly increasing demands for electricity. All ten generating units are powered by Cleveland Diesel Model 498 turbocharged 2-cycle diesel engines. The successful application of the principle of turbocharging to the 2-cycle engine has made possible the development of the Model 498, which is one of the first 2-cycle diesel engines of American design to be turbocharged. Fuel economy has been increased, more power is delivered with little increase in weight and much lower maintenance costs are also expected.

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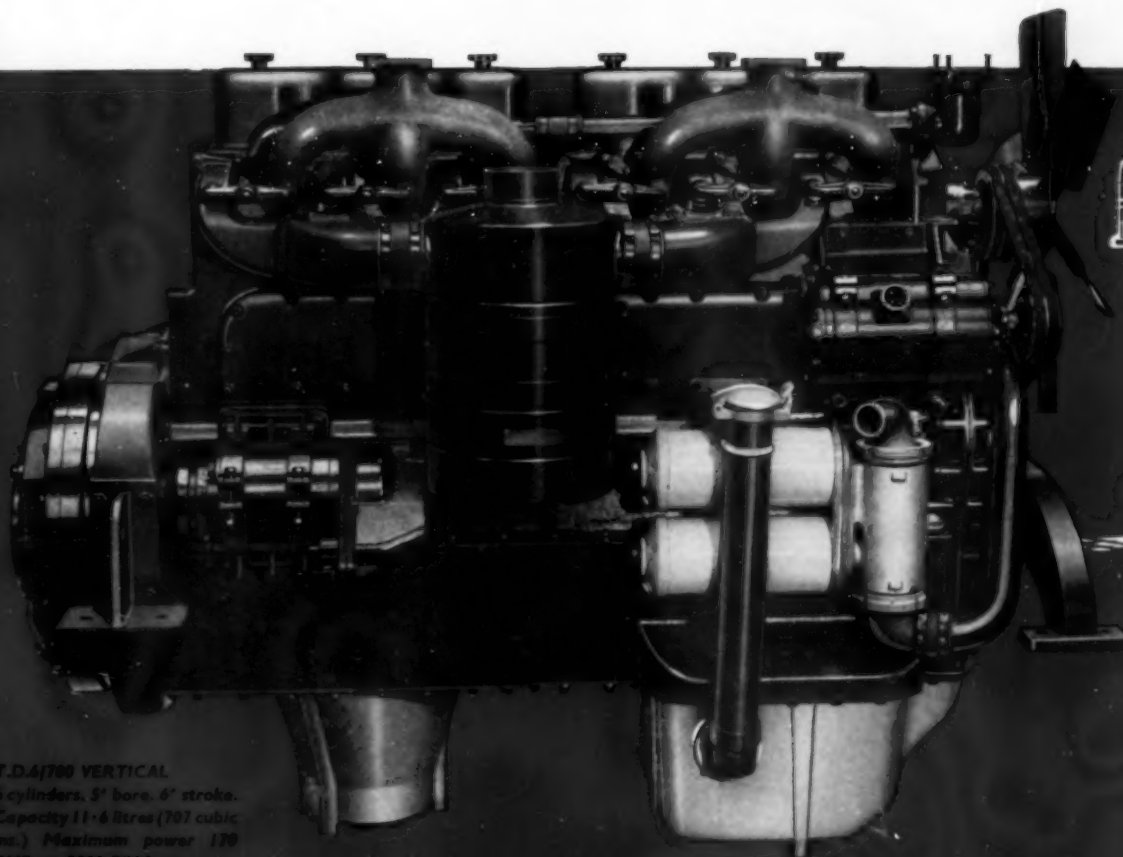
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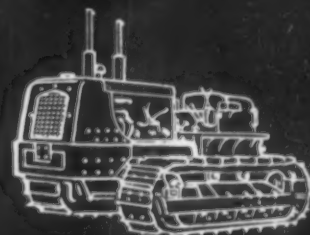
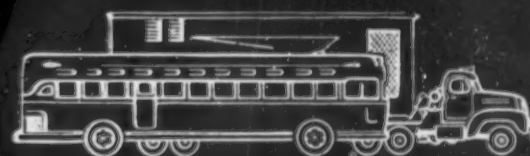
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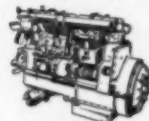
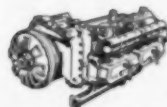
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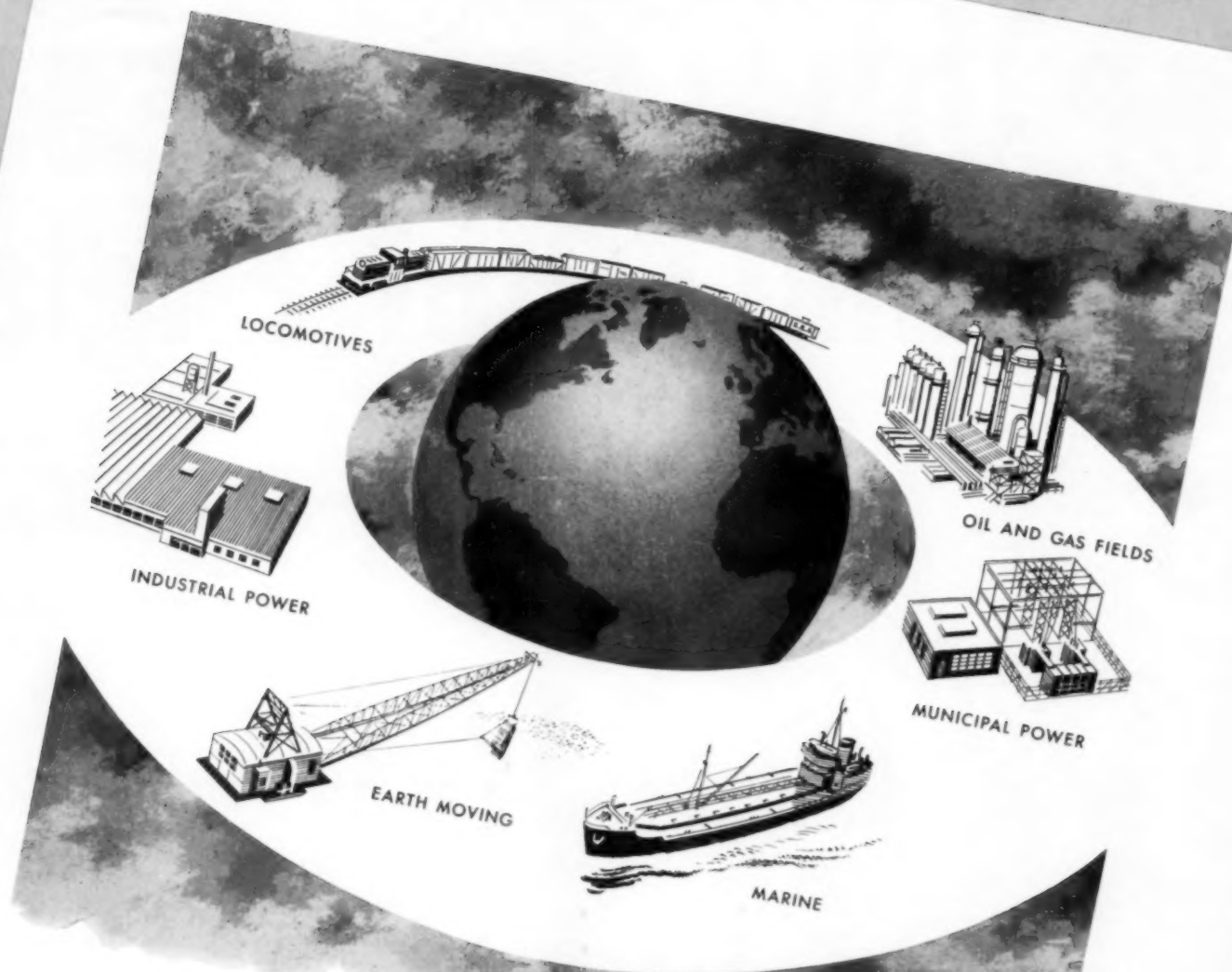
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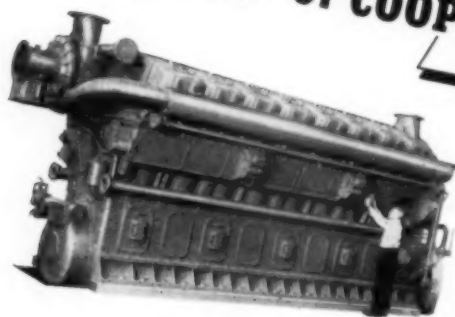


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